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1991

EPA Superfund
Record of Decision:

SANGAMO WESTON, INC./TWELVE-MILE CREEK/LAKE HARTWELL PCB CONTAMINATION
EPA ID: SCD003354412
OU 01
PICKENS, SC
12/19/1990

Text:

This ROD has associated ESDs.

SITE NAME AND LOCATION

SANGAMO WESTON/TWELVE-MILE CREEK/LAKE HARTWELL
PCB CONTAMINATION SITE
OPERABLE UNIT ONE
PICKENS, PICKENS COUNTY, SOUTH CAROLINA

#SBP
STATEMENT OF BASIS AND PURPOSE

THIS DECISION DOCUMENT PRESENTS THE SELECTED REMEDIAL ACTION FOR OPERABLE UNIT ONE OF THE SANGAMO WESTON/TWELVE-MILE CREEK/LAKE HARTWELL PCB CONTAMINATION SITE IN PICKENS, SOUTH CAROLINA, CHOSEN IN ACCORDANCE WITH CERCLA, AS AMENDED BY SARA AND, TO THE EXTENT PRACTICABLE, THE NATIONAL CONTINGENCY PLAN. THIS DECISION IS BASED ON THE ADMINISTRATIVE RECORD FILE FOR THIS SITE.

THE STATE OF SOUTH CAROLINA CONCURS WITH THE SELECTED REMEDY.

ASSESSMENT OF THE SITE

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THIS SITE, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION SELECTED IN THIS ROD, MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT.

STATUTORY DETERMINATIONS

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, COMPLIES WITH FEDERAL AND STATE REQUIREMENTS THAT ARE LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE TO THE REMEDIAL ACTION, AND IS COST-EFFECTIVE. THIS REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT (OR RESOURCE RECOVERY) TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE AND SATISFIES THE STATUTORY PREFERENCE FOR REMEDIES THAT EMPLOY TREATMENT THAT REDUCES TOXICITY, MOBILITY, OR VOLUME AS A PRINCIPAL ELEMENT. BECAUSE THIS REMEDY WILL NOT RESULT IN HAZARDOUS SUBSTANCES REMAINING ON-SITE ABOVE HEALTH-BASED LEVELS, THO FIVE-YEAR REVIEW WILL NOT APPLY TO THE SOURCE REMEDIAL ACTION.

GREER C. TIDWELL DATE: DECEMBER 19, 1990
REGIONAL ADMINISTRATOR

SANGAMO WESTON/TWELVE-MILE CREEK/ LAKE HARTWELL
PCB CONTAMINATION SITE
PICKENS, PICKENS COUNTY, SOUTH CAROLINA

#INT
INTRODUCTION

THE SANGAMO WESTON/TWELVE-MILE CREEK/LAKE HARTWELL PCB CONTAMINATION SITE (SANGAMO WESTON) WAS PROPOSED FOR INCLUSION ON THE NATIONAL PRIORITIES LIST (NPL) IN JANUARY 1987 AND WAS FINALIZED IN FEBRUARY 1990. THE SITE RANKS 553 OUT OF 1218 NPL SITES.

#SNL
1.0 SITE NAME AND LOCATION

THE SANGAMO WESTON SITE IS LOCATED IN PICKENS COUNTY, SOUTH CAROLINA (FIGURE 1). THE ROD ADDRESSES SEVEN (7) SEPARATE DISPOSAL AREAS. FIVE PRIVATE PROPERTIES AND THE SANGAMO PLANT SITE DISPOSAL AREAS WERE REPORTED TO EPA BY SANGAMO IN THEIR 103(C) NOTIFICATION TO THE AGENCY. THE PRIVATE PROPERTIES ARE; CROSS ROADS SITE, BREAZEALE SITE, DODGENS SITE, WELBORN SITE, AND THE NIX SITE. THE JOHN TROTTER SITE, ALSO ADDRESSED IN THIS RECORD OF DECISION, WAS DISCOVERED BY EPA DURING SUBSEQUENT SAMPLING INVESTIGATIONS.

ALL SITES ARE SITUATED IN THE PIEDMONT PHYSIOGRAPHIC PROVINCE OF SOUTH CAROLINA. THE PIEDMONT PROVINCE IS A BROAD PLATEAU RANGING IN ELEVATION FROM 400 TO 1200 FEET ABOVE MEAN SEA LEVEL. THE GEOLOGY OF THE AREA CONSISTS OF GNEISSES AND SCHISTS, INTRUDED BY IGNEOUS ROCKS, E.G., GRANITES. THE BEDROCK IS OVERLAIN BY A LAYER OF SAPROLITE AND SLOPE WASH DEPOSITS, AND ALLUVIAL FILL MATERIAL OF VARIABLE THICKNESS (OVERSTREET, 1965).

THE PLATEAU REGION IS DISSECTED BY STREAMS WHICH HAVE DEVELOPED A DENDRITIC DRAINAGE PATTERN. THIS DRAINAGE PATTERN IS CHARACTERIZED BY IRREGULAR BRANCHING OF STREAMS DEVELOPED UPON MATERIALS WITH A UNIFORM RESISTANCE TO EROSION. STREAM FLOW IN THE PROVINCE IS TO THE SOUTHEAST. MAJOR STREAMS IN THE PROVINCE HAVE DEVELOPED IN VALLEY BOTTOMS UPON A SAPROLITE OR SLOPE WASH DEPOSIT BASE. TRIBUTARIES FLOW FROM RIDGE AREAS IN AN IRREGULAR PATTERN TO-THESE MAJOR STREAMS.

GROUNDWATER IN THE PIEDMONT PROVINCE OCCURS PRINCIPALLY UNDER UNCONFINED CONDITIONS IN SAPROLITE AND SLOPE WASH DEPOSITS. GROUNDWATER IS THE RESULT OF DIRECT INFILTRATION OF PRECIPITATION, WITH PRINCIPAL RECHARGE AREAS IN TOPOGRAPHICALLY HIGH AREAS (RIDGE TOPS) AND DISCHARGE AREAS NEAR STREAMS IN VALLEY BOTTOMS. THE GROUNDWATER FLOW REGIME IN THE PIEDMONT PROVINCE IS CONTROLLED BY THE DEGREE OF RIDGE AND VALLEY DEVELOPMENT ON THE PLATEAU AREA.

GROUNDWATER IN CRYSTALLINE ROCK IS GENERALLY RESTRICTED TO THE UPPER ZONE OF THE BEDROCK WHERE FRACTURES AND JOINTS MOST COMMONLY OCCUR. GROUNDWATER OCCURRENCE IN CRYSTALLINE ROCKS DECREASES WITH INCREASING DEPTH BECAUSE JOINTS AND FRACTURES REDUCE IN SIZE AND NUMBER.

NEITHER THE SAPROLITE NOR THE ROCK ARE EXTENSIVELY USED AS WATER SUPPLIES. MOST RESIDENCES AND INDUSTRIAL OR COMMERCIAL ENTERPRISES WITHIN THE PIEDMONT, INCLUDING PICKENS COUNTY, OBTAIN DRINKING WATER FROM SURFACE WATER SOURCES.

1.1 THE SANGAMO WESTON SITE

THE SANGAMO WESTON SITE IS APPROXIMATELY 220 ACRES IN SIZE AND IS LOCATED APPROXIMATELY ONE MILE NORTHWEST OF THE TOWN OF PICKENS (FIGURE 2). BASED ON THE PRELIMINARY FIELD INVESTIGATION, THE SANGAMO WESTON PLANT SITE HAS BEEN DIVIDED INTO TEN AREAS. THESE AREAS ARE IDENTIFIED AS A THROUGH H, THE SEPTIC DRAIN FIELD, AND THE WASTEWATER TREATMENT FACILITY IS EXHIBITED ON THE SANGAMO WESTON SITE WITH ELEVATIONS RANGING FROM 930 FEET ABOVE MEAN SEA LEVEL (MSL) AT TOWN CREEK, BORDERING THE SITE TO THE SOUTH, TO ABOUT 1,150 FEET ABOVE MSL ON THE TOP OF A LINEAR EAST-WEST TRENDING RIDGE DISSECTING THE PROPERTY. THE MANUFACTURING BUILDING IS LOCATED ON THE TOP OF THE RIDGE AT AN ELEVATION OF ABOUT 1,100 FEET ABOVE MSL. THE PAVED PARKING AREA FOR THE MANUFACTURING BUILDING IS LOCATED ALONG THE SOUTH FLANK OF THE RIDGE ADJACENT TO THE BUILDING.

THE WASTEWATER TREATMENT FACILITY, CONSISTING OF A STABILIZATION LAGOON, AN INACTIVE EQUALIZATION BASIN AND A CONCRETE-LINED EQUALIZATION BASIN, IS LOCATED SOUTH OF THE MANUFACTURING BUILDING. DISCHARGE FROM THE STABILIZATION LAGOON PASSES OVER A CONCRETE SPILLWAY UNDER SANGAMO ROAD AND THEN TO TOWN CREEK. THE DISCHARGE IS REGULATED UNDER AN NPDES PERMIT ISSUED BY THE STATE OF SOUTH CAROLINA TO THE CURRENT OPERATOR OF THE PLANT.

THE RIDGE BISECTING THE SANGAMO WESTON SITE ACTS AS A DIVIDE FOR SURFACE AND GROUNDWATER. SURFACE WATER RUNOFF AND GROUNDWATER ON THE SOUTH SIDE OF THE RIDGE FLOWS SOUTHWARD AND DISCHARGES INTO TOWN CREEK. SURFACE WATER RUNOFF AND GROUNDWATER ON THE NORTH SIDE OF THE RIDGE DRAINS NORTHWARD AND DISCHARGES INTO UNNAMED TRIBUTARIES TO TWELVE-MILE CREEK.

MOST OF THE SANGAMO WESTON PROPERTY, INCLUDING MANY OF THE INVESTIGATION AREAS, IS FORESTED. THE ONLY UNFORESTED AREAS INCLUDE THE WASTEWATER TREATMENT FACILITY, SEPTIC DRAIN FIELD, AREA A AND AREA F. THE WASTEWATER TREATMENT FACILITY AND SEPTIC DRAIN FIELDS ARE VEGETATED WITH GRASS AND WEEDS. AREA A IS COVERED WITH KUDZU. AREA F IS SURROUNDED WITH FOREST AND IS COVERED WITH TALL GRASS, WEEDS, AND SAPLINGS. THE MANUFACTURING FACILITY, INCLUDING THE PAVED PARKING LOT, IS NOT FORESTED OR VEGETATED. HOWEVER, THE LAWN SURROUNDING THE FACILITY IS GRASSED, WITH TREES.

THE SANGAMO WESTON PLANT SITE IS LOCATED IN THE PIEDMONT SECTION OF SOUTH CAROLINA ON THE EASTERN SLOPE OF THE SOUTHERN APPALACHIAN MOUNTAINS. THE FIRST RIDGE OF THE MOUNTAINS IS APPROXIMATELY TEN MILES TO THE NORTH, AND THE MAIN RIDGE IS APPROXIMATELY FORTY MILES TO THE NORTH. THESE MOUNTAINS GENERALLY PROTECT THIS AREA FROM THE FULL FORCE OF COLD FRONTS WHICH MOVE SOUTHEASTWARD TOWARD THIS AREA IN THE WINTER MONTHS.

THE TEMPERATURE RISES TO 90 DEGREE FAHRENHEIT OR ABOVE ON ALMOST HALF OF THE DAYS DURING THE SUMMER MONTHS, BUT USUALLY FALLS TO 70 DEGREE FAHRENHEIT OR LOWER DURING THE NIGHT. WINTERS ARE MODERATE, WITH THE TEMPERATURE REMAINING BELOW FREEZING THROUGHOUT THE DAYLIGHT HOURS ONLY THREE TO FOUR TIMES DURING A NORMAL YEAR. APPROXIMATELY TWO FREEZING RAINSTORMS AND TWO OR THREE SMALL SNOWSTORMS OCCUR EACH WINTER. THE MEAN ANNUAL TEMPERATURE FOR THIS AREA IS 60.7 DEGREE FAHRENHEIT.

1.2 THE BREAZEALE SITE

THE BREAZEALE SITE IS APPROXIMATELY SEVEN ACRES IN SIZE AND IS LOCATED ABOUT ONE MILE SOUTH-SOUTHWEST OF PICKENS, ON WOLF CREEK ROAD (FIGURE 3). THE SOUTH AND SOUTHWEST PORTION OF THE SITE ARE LOCATED ON THE FLOOD PLAIN OF WOLF CREEK WHICH BORDERS THE SITE TO THE SOUTH. SURFACE ELEVATIONS RANGE FROM 872 FEET ABOVE MSL ALONG WOLF CREEK TO 910 FEET ABOVE MSL AT THE NORTHWEST CORNER OF THE SITE.

A DRAINAGE DITCH BORDERS THE SITE TO THE EAST. THIS DITCH DRAINS SOUTHWARD AND DISCHARGES INTO WOLF CREEK AT THE SOUTHEAST CORNER OF THE SITE. WOLF CREEK BORDERS THE SITE TO THE SOUTH. APPROXIMATELY 1,500 FEET TO THE NORTHWEST AND UPSTREAM ON WOLF CREEK IS A DAM FOR A US SOIL CONSERVATION SERVICE LAKE. SEEPAGE FROM THIS DAM CREATES MINOR FLOW IN THE DRAINAGE DITCH ON THE EAST BOUNDARY OF THE SITE.

SURFACE WATER RUNOFF ON-SITE OCCURS AS A RESULT OF DIRECT PRECIPITATION. SURFACE WATER ON-SITE DRAINS SOUTH TO SOUTHEAST TOWARD WOLF CREEK WHERE

IT DISCHARGES. A SMALLER PORTION OF RUNOFF DRAINS EASTWARD TOWARDS THE DRAINAGE DITCH. THE DRAINAGE DITCH DISCHARGES INTO WOLF CREEK. WOLF CREEK FLOWS SOUTHWESTWARD ALONG THE SOUTH BOUNDARY OF THE SITE.

VEGETATION CONSISTS PRIMARILY OF GRASS COVER. STANDS OF TREES, SOME OF WHICH ARE DENSE WITH THICK UNDERGROWTH OCCUR SOUTH OF THE AREA OF WASTE DEPOSITION TO WOLF CREEK. ALONG THE BANKS OF WOLF CREEK ARE SMALL TREES, SHRUBS AND THICK MARSH GRASS.

1.3 THE NIX SITE

THE NIX SITE IS APPROXIMATELY 7.5 ACRES IN SIZE AND IS LOCATED APPROXIMATELY TWO MILES NORTHEAST OF PICKENS. THE SITE IS LOCATED JUST WEST OF NORTH CEDAR ROCK ROAD BETWEEN GLASSY MOUNTAIN CHURCH ROAD AND OLD FARRS BRIDGE ROAD (FIGURE 4).

A DIRT LOGGING ROAD LEADS FROM NORTH CEDAR ROCK ROAD TO THE SITE AREA. AN UNNAMED TRIBUTARY TO WOLF CREEK IS LOCATED 100 FEET WEST OF THE SITE. SURFACE ELEVATIONS RANGE FROM 1046 FEET ABOVE MSL AT THE WEST END OF THE SITE TO 1,105 FEET ABOVE MSL AT THE EAST END OF THE SITE.

THE MOST PROMINENT SURFACE FEATURE ON THE NIX SITE IS A NATURALLY OCCURRING 400 FOOT LONG RAVINE WHICH TRENDS FROM EAST TO WEST. THIS RAVINE IS APPROXIMATELY THIRTY FEET DEEP ON ITS EASTERN END AND BECOMES SHALLOWER TOWARD THE WESTERN END AS IT OPENS UP INTO A MARSH. A SMALL MAN MADE POND IS LOCATED ON THE FAR WEST END OF THE SITE AT THE MOUTH OF THE RAVINE. WATER FEEDING THE POND AND MARSH COMES FROM SMALL SPRINGS AT THE HEAD OF THE MARSH AND FROM SURFACE RUNOFF. TWO STREAMS CREATED BY THE OUT FALL FROM THE MAN MADE POND FLOW INTO THE UNNAMED TRIBUTARY TO WOLF CREEK.

VEGETATION AT THE NIX SITE CONSISTS OF A GRASS COVERED PASTURE WITH WOODED PORTIONS SOUTH OF THE RAVINE. TREES, TALL MARSH GRASSES AND KUDZU ARE PRESENT IN THE RAVINE. VEGETATION NORTH OF THE RAVINE CONSISTS OF GRASS, WEEDS, SMALL SHRUBS AND YOUNG TREES.

SURFACE WATER RUNOFF OUTSIDE OF THE RAVINE FLOWS WESTWARD AND DISCHARGES DIRECTLY INTO THE UNNAMED TRIBUTARY. SURFACE WATER IN THE UNNAMED TRIBUTARY OF WOLF CREEK, FLOWS SOUTH AND EMPTIES INTO WOLF CREEK APPROXIMATELY ONE-HALF MILE SOUTHWEST OF THE SITE.

1.4 THE DODGENS SITE

THE DODGENS SITE IS LOCATED THREE MILES NORTHWEST OF PICKENS AND IS ADJACENT TO THE MIDDLE FORK OF TWELVE-MILE CREEK (FIGURE 5). THE SITE IN ABOUT 6.5 ACRES IN SIZE. THE SITE IS RELATIVELY FLAT WITH SURFACE ELEVATIONS RANGING FROM 940 FEET ABOVE MSL ADJACENT TO THE CREEK TO ABOUT 949 FEET ABOVE MSL AT THE WEST SIDE OF THE SITE; A TOPOGRAPHIC RELIEF OF ABOUT NINE FEET. SHARP RISES IN TOPOGRAPHY OCCUR ALONG THE NORTH, WEST AND SOUTH SIDE OF THE SITE. ELEVATIONS TO THE NORTH AND

WEST EXCEED 970 FEET.

MIDDLE FORK TWELVE-MILE CREEK FLOWS SOUTHWARD ALONG THE EAST BOUNDARY OF THE SITE. AN UNNAMED TRIBUTARY LOCATED ALONG THE SOUTHERN END OF THE SITE FLOWS INTO THE CREEK. A SMALL MAN-MADE POND IS LOCATED AT THE SOUTH END OF THE SITE.

NINE TIMES ROAD EXTENDS IN A NORTHWEST DIRECTION WEST OF THE SITE. A DIRT ROAD LEADS FROM NINE TIMES ROAD TO THE SOUTH END OF THE SITE. THE ROAD TURNS NORTHWARD AND EXTENDS ALONG THE WEST AND NORTH PERIMETER OF THE SITE.

VEGETATION AT THE DODGENS SITE CONSISTS OF GRASS COVER. THE HILLS BORDERING THE SITE TO THE NORTH, WEST AND SOUTH ARE COVERED WITH STANDS OF TREES AND UNDERGROWTH. A DENSE STAND OF TREES AND UNDERGROWTH ALSO

EXTENDS ALONG THE BANKS OF MIDDLE FORK TWELVE-MILE CREEK AT THE EAST SIDE OF THE SITE.

SURFACE WATER RUNOFF ON-SITE OCCURS AS A RESULT OF DIRECT PRECIPITATION. ON-SITE SURFACE WATER DRAINS SOUTHEASTWARD TOWARDS MIDDLE FORK TWELVE-MILE CREEK. THE CREEK FLOWS SOUTHWARD ALONG THE EAST BOUNDARY OF THE SITE AND TURNS EASTWARD AT THE SOUTHEAST CORNER OF THE SITE. A SMALL UNNAMED TRIBUTARY LOCATED ALONG THE SOUTHERN END OF THE SITE FLOWS INTO THE CREEK. A SMALL STREAM ORIGINATING WEST OF THE SITE CROSSES NINE TIMES ROAD, BORDERS THE SOUTHWEST PORTION OF THE SITE AND DISCHARGES INTO THE UNNAMED TRIBUTARY. A PORTION OF SURFACE WATER FLOW FROM THE STREAM IS DIVERTED TO A SMALL MAN-MADE POND LOCATED AT THE SOUTH END OF THE SITE. THE OUTFALL FROM THE POND DISCHARGES INTO THE UNNAMED TRIBUTARY. SURFACE WATER ON THE DODGENS SITE DRAINS DIRECTLY TO MIDDLE FORK TWELVE-MILE CREEK.

1.5 THE CROSS ROADS SITE

THE CROSS ROADS SITE IS ABOUT FIVE ACRES IN SIZE AND IS LOCATED APPROXIMATELY THREE MILES SOUTHWEST OF PICKENS (FIGURE 6). THE SITE IS HEAVILY WOODED WITH AN UNNAMED TRIBUTARY TO TWELVE-MILE CREEK ALONG THE SOUTHERN BOUNDARY. SURFACE ELEVATIONS RANGE FROM 11030 FEET MSL, IN THE NORTHWEST PORTION OF THE SITE, TO 960 FEET IL ALONG THE UNNAMED TRIBUTARY BORDERING THE SOUTHERN PORTION OF THE SITE, A TOPOGRAPHIC RELIEF OF APPROXIMATELY SEVENTY FEET. A WIDE VARIETY OF DOMESTIC WASTE, INCLUDING BOTTLES, CANS, AND CAR BODIES ARE DISPOSED THROUGHOUT THE SITE.

PENROSE DRIVE EXTENDS IN A NORTHEAST-SOUTHEAST DIRECTION WEST OF THE SITE. AN OLD ROADBED EXTENDS FROM PENROSE DRIVE ACROSS THE NORTHWEST SECTION OF THE SITE. THIS ROAD IS FENCED OFF AT BOTH ENDS WHERE IT EXITS THE SITE. SOUTH OF THE OLD ROADBED, IN THE NORTHWEST PORTION OF THE SITE, IS AN ABANDONED HOME SITE. ALL THAT REMAINS IS AN ABANDONED WELL (APPROXIMATELY FOUR FEET IN DIAMETER X TWENTY FEET DEEP), AN OUTHOUSE AND VARIOUS HOUSEHOLD DEBRIS. THE CROSS ROADS SITE IS HEAVILY

WOODED WITH PORTIONS CONTAINING DENSE UNDERGROWTH. DENSE UNDERGROWTH ALSO EXTENDS ALONG THE BANKS OF THE UNNAMED TRIBUTARY OF TWELVE-MILE CREEK.

SURFACE WATER RUNOFF ON-SITE OCCURS AS A RESULT OF DIRECT PRECIPITATION. ON-SITE SURFACE WATER DRAINS SOUTHWARD TOWARDS THE UNNAMED TRIBUTARY OF TWELVE-MILE CREEK. THE TRIBUTARY FLOWS EASTWARD ALONG THE SOUTHERN BOUNDARY OF THE SITE AND TURNS NORTHEASTWARD AT THE SOUTHEAST CORNER OF THE SITE. IT THEN CONTINUES IN THIS GENERAL DIRECTION FOR APPROXIMATELY 1,000 FEET WHERE IT DISCHARGES INTO TWELVE-MILE CREEK.

1.6 THE JOHN TROTTER SITE

THE JOHN TROTTER SITE IS ABOUT THREE ACRES IN SIZE AND IS LOCATED APPROXIMATELY TWO MILES NORTH-NORTHEAST OF PICKENS NEAR TROTTER HILL

ROAD AND TOWN CREEK SCHOOL ROAD (FIGURE 7). THE SITE IS LOCATED BEHIND A MACHINE SHOP. AN UNNAMED TRIBUTARY TO TOWN CREEK BORDERS THE NORTHEASTERN PORTION OF THE SITE. SURFACE ELEVATIONS RANGE FROM 1,074 FEET ABOVE MSL, NEAR TROTTER HILL ROAD, TO 1,030 FEET ABOVE MSL NEAR THE UNNAMED TRIBUTARY TO TOWN CREEK, A TOPOGRAPHIC RELIEF OF ABOUT FORTY-FOUR FEET. A BROAD GRASSED PLAIN IS LOCATED ALONG THE WEST BANKS OF THE TRIBUTARY NORTH OF THE SITE.

VEGETATION AT THE JOHN TROTTER SITE CONSISTS OF GRASS COVER SURROUNDING THE MACHINE SHOP ON THE WESTERN END OF THE SITE WITH A DENSELY WOODED AREA CONTAINING THICK UNDERGROWTH ON THE EASTERN END OF THE SITE. THE LOW PLAIN AREA NORTH OF THE SITE IS VEGETATED WITH GRASS.

SURFACE WATER RUNOFF ON-SITE OCCURS AS A RESULT OF DIRECT PRECIPITATION. ON-SITE SURFACE WATER DRAINS NORTH-EASTWARD TOWARDS THE UNNAMED TRIBUTARY TO TOWN CREEK. THIS TRIBUTARY FLOWS SOUTH-EASTWARD ALONG THE NORTHEASTERN BOUNDARY OF THE SITE AND EMPTIES INTO ANOTHER UNNAMED TRIBUTARY TO TOWN CREEK. THE SECOND UNNAMED TRIBUTARY CONTINUES SOUTH-SOUTHEAST AND EMPTIES INTO TOWN CREEK, 0.5 MILES SOUTH-SOUTHEAST OF THE SITE.

1.7 THE WELBORN SITE

THE WELBORN SITE IS APPROXIMATELY FOUR ACRES IN SIZE AND IS LOCATED ABOUT TWO MILES EAST OF PICKENS NEAR TURNER ROAD (FIGURE 8). THE SITE IS MARKED BY ERODED AREAS WITH RAVINE DEPTHS AS MUCH AS TWENTY-FIVE FEET. SITE ELEVATIONS RANGE FROM 1010 FEET ABOVE MSL, AT THE EAST SIDE OF THE SITE, TO 1075 FEET MSL AT THE NORTHWEST PORTION OF THE SITE, A TOPOGRAPHIC RELIEF OF SIXTY-FIVE FEET. SHARP CHANGES IN TOPOGRAPHY OCCUR ALONG THE SIDES OF THE RAVINES.

THERE ARE NO STREAMS IN THE IMMEDIATE AREA OF THE SITE. APPROXIMATELY 600 FEET TO THE EAST IS AN UNNAMED TRIBUTARY OF WOLF CREEK WHICH FLOWS SOUTH. WOLF CREEK IS APPROXIMATELY 1400 FEET SOUTH OF THE SITE AND FLOWS SOUTHWESTWARD. VARIOUS TYPES OF DEBRIS INCLUDING HOUSEHOLD

GARBAGE, GLASS, SCRAP METAL, LARGE METAL OBJECTS, (E.G., WASHING MACHINES, AND INDUSTRIAL WASTE MATERIAL) ARE DEPOSITED IN THE RAVINES.

#SHEA
2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

THE EXISTING SANGAMO WESTON PLANT WAS CONSTRUCTED IN THREE PHASES BEGINNING IN 1955 WITH PLANT CONSTRUCTION FOR ELECTROLYTIC CAPACITOR MANUFACTURING. ADDITIONS WERE MADE IN 1956 AND 1961 FOR THE POWER FACTOR AND MICA CAPACITOR MANUFACTURING OPERATIONS.

THE MAJOR PRODUCTS MANUFACTURED BY THE SANGAMO WESTON PICKENS PLANT INCLUDED ELECTROLYTIC CAPACITORS, MICA CAPACITORS, POWER FACTOR CAPACITORS, AND POTENTIOMETERS. PCBS WERE USED AS THE DIELECTRIC FLUID

IN POWER FACTOR CAPACITORS. AROCLOR 1242, 1254 AND MCS 1016 (PRODUCTS OF THE MONSANTO CORPORATION) WERE USED AS THE DIELECTRIC FLUIDS. IN THE EARLY 1970S, THE FACILITY MADE A SWITCH TO MCS 1016 (A LESS CHLORINATED PCB PRODUCT OF THE MONSANTO CORPORATION), FROM AROCLOR 1242, AS THE PRIMARY DIELECTRIC FLUID.

IN 1968, CONSTRUCTION BEGAN ON A 1.4 MILLION GALLON/DAY (MGD) WASTEWATER TREATMENT FACILITY. THE FACILITIES WERE COMPLETED IN 1970. THE SYSTEM CONSISTED OF A PRIMARY SETTLING BASIN AND A LARGE STABILIZATION LAGOON. THE TREATMENT SYSTEM WAS DESIGNED FOR (AMONG OTHER THINGS) THE NEUTRALIZATION OF ACID SOLUTIONS USED IN THE ETCHING AND FORMING PROCESSES AND FOR PRECIPITATION OF DISSOLVED MATERIALS SUCH AS ALUMINUM. THE ALUMINUM PRECIPITATES SETTLED IN A PRIMARY SETTLING BASIN.

DURING THE 1970S AND INTO THE 1980S, A NUMBER OF SIGNIFICANT MODIFICATIONS TOOK PLACE TO BOTH GENERAL PLANT OPERATIONS AND THE OPERATION OF THE WASTEWATER TREATMENT FACILITIES. A BENTONITE CLAY LAYER WAS ADDED TO THE STABILIZATION LAGOON TO HELP SETTLE PCB MATERIALS THAT MIGHT BE PRESENT IN THE LIQUID PHASE. IN ADDITION, THE DRAINS FROM THE TWO IMPREGNATION AREAS OF THE POWER FACTOR DIVISION WERE SEALED OFF FROM THE WASTE TREATMENT FACILITIES. THIS ACTION WAS TAKEN TO ELIMINATE THE PATHWAY OF PCB ENTRY INTO THE WASTEWATER SYSTEM.

THREE SEPTIC TANK DRAIN FIELD AREAS EXIST ON THE PLANT PROPERTY FOR TREATMENT AND DISPOSAL OF SANITARY WASTEWATERS FROM THE PLANT. TWO DRAIN FIELDS ARE LOCATED ADJACENT TO EACH OTHER IN AN AREA NORTH OF THE BUILDING, A THIRD AREA IS LOCATED SOUTHWEST OF THE PLANT.

WASTE MATERIALS FROM PAST PRODUCTION ACTIVITIES HAVE BEEN DEPOSITED IN A NUMBER OF AREAS ON THE SANGAMO WESTON PROPERTY. ON-SITE LANDFILLING ACTIVITIES BEGAN IN THE MID 1950S AND CONTINUED OFF AND ON UNTIL 1972. THE MATERIAL INCLUDED SCRAP CAPACITORS AND ALUMINUM HYDROXIDE SLUDGE AS WELL AS OTHER ASSORTED INDUSTRIAL REFUSE. ON-SITE DISPOSAL OF PLANT WASTE MATERIALS WAS DISCONTINUED IN JULY 1972.

PRIOR TO 1972, GENERAL PLANT WASTE WAS ALSO DISPOSED AT PRIVATELY AND PUBLICLY OWNED OFF-SITE AREAS IN THE PICKENS COUNTY AREA. SOME OF THE MATERIALS TAKEN TO OFF-SITE DISPOSAL SITES CONTAINED PCBS.

AS PART OF THE MANUFACTURING PROCESS, ALL CAPACITORS WERE INSPECTED AND TESTED. THE CAPACITORS THAT FAILED TO MEET QUALITY CONTROL CRITERIA WERE DISCARDED ALONG WITH OTHER PROCESS AND NON-PROCESS SOLID WASTES. THE SOLID WASTE WAS DISPOSED OF ON PLANT PROPERTY IN SEVERAL LOCATIONS AND AT A NUMBER OF OFF-SITE LOCATIONS. THE OFF-SITE AREAS ADDRESSED IN THIS ROD ARE DESIGNATED AS THE NIX, DODGENS, WELBORN, CROSS ROADS, JOHN TROTTER AND BREAZEALE SITES.

IN THE MID-1970S, ENVIRONMENTAL MONITORING PROGRAMS BY EPA AND THE SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (DHEC) LED TO THE DETECTION OF POLYCHLORINATED BIPHENYLS (PCBS) IN THE SEDIMENTS OF

LAKE HARTWELL, ITS TRIBUTARIES, AND IN SOILS UNDERLYING FORMER DUMP SITES IN PICKENS COUNTY THAT WERE USED BY THE SANGAMO WESTON, INC. MANUFACTURING PLANT IN PICKENS. THE PCBS IN THE WATER RESOURCES WERE TRACED TO EFFLUENT ASSOCIATED WITH THE SANGAMO PLANT, A PRODUCER OF ELECTRIC CAPACITORS. THE PLANT USED PCBS AS A DIELECTRIC, OR NON-CONDUCTING, FLUID IN CAPACITORS UNTIL 1977, WHEN THE FEDERAL GOVERNMENT IMPOSED A BAN ON THE MANUFACTURE AND USE OF PCBS.

SOUTH CAROLINA DHEC FISH STUDY

IN 1974, DHEC CONDUCTED A PCB ANALYSIS OF FISH IN SOUTH CAROLINA AND DETECTED PCBS IN A FISH SAMPLE AT TWO SITES IN THE TWELVE-MILE CREEK AREA OF LAKE HARTWELL. FURTHER DHEC SAMPLING IN 1975 AND 1976 DEMONSTRATED ADDITIONAL PCB CONTAMINATION OF SEDIMENT AND OF FISH, ABOVE THE US FOOD AND DRUG ADMINISTRATION (FDA) SAFE TOLERANCE LIMIT OF 5.0 PARTS PER MILLION (PPM). IN AUGUST 1976, DHEC, IN CONSULTATION WITH EPA, INITIATED ANNUAL PCB TESTING OF FISH AND SEDIMENT IN LAKE HARTWELL. THE SAME MONTH, EPA AND DHEC ISSUED A JOINT ADVISORY AGAINST CONSUMING FISH FROM ANY PART OF THE LAKE. IN OCTOBER 1976, THE ADVISORY WAS MODIFIED BASED ON FURTHER STUDY TO INCLUDE ONLY THE SENECA RIVER ARM OF LAKE HARTWELL ABOVE HIGHWAY 24.

IN 1984, THE FDA LOWERED THE SAFE TOLERANCE LEVEL FROM 5.0 PPM TO 2.0 PPM. EPA AND DHEC EXPANDED THE EXISTING FISH CONSUMPTION ADVISORY TO INCLUDE ALSO ALL FISH OVER THREE POUNDS CAUGHT ANYWHERE IN THE LAKE. DHEC THEN REASSESSED ITS FISH TISSUE MONITORING PROGRAM AND DEVELOPED MORE RIGOROUS SAMPLING PROCEDURES THAT WOULD ENABLE RESEARCHERS TO ASSESS TRENDS. DHEC'S MONITORING PROGRAM WAS REVISED IN 1985 AND INITIATED IN 1986.

FIVE SPECIES OF FISH OF SIMILAR WEIGHTS FOR EACH SPECIES WERE SAMPLED $ROM 3-5 TESTING STATIONS. THE STATIONS WERE SELECTED BASED ON HISTORICAL KNOWLEDGE OF PCBS IN THE LAKE AND WERE CHOSEN TO PROVIDE COMPREHENSIVE COVERAGE. FOR EXAMPLE, SV-107 IN TWELVE-MILE CREEK REPRESENTS THE MOST CONTAMINATED PORTION OF LAKE HARTWELL. THE TWO

STATIONS IMMEDIATELY SOUTH OF THIS STATION, SV-532 AND SV-235, REPRESENT A LARGE, OPEN-WATER AREA OF THE LAKE AS FAR REMOVED FROM THE CONTAMINATION SOURCE AS POSSIBLE, AND SV-641 ALLOWS FOR CROSS COMPARISONS BECAUSE IT IS IN THE OTHER MAJOR RIVER TRIBUTARY TO LAKE HARTWELL AND IS NOT SUBJECT TO DIRECT PCB INPUT.

THE FISH IN DHEC'S RESEARCH INCLUDE CRAPPIE, LARGE MOUTH BASS AND HYBRID BASS WHICH REPRESENT OVER EIGHTY PERCENT OF THE GAME FISH CAUGHT BY THE PUBLIC. HYBRID BASS MOVE FROM PLACE TO PLACE, POTENTIALLY MOVE IN AND OUT OF CONTAMINATED AREAS AND, THEREFORE, COULD DEMONSTRATE WORST-CASE CONTAMINANT LEVELS IN FISH OUTSIDE THE ADVISORY AREA. WHITE AND CHANNEL CATFISH ALSO ARE INCLUDED IN THE STUDY BECAUSE THEY DWELL ALONG AND FEED OFF LAKE BOTTOMS WHERE PCB MOLECULES TEND TO SETTLE AND FORM HIGH CONCENTRATIONS. CATFISH, THEREFORE, TEND TO INGEST MORE CONTAMINANTS THAN FISH LIVING OR FEEDING IN OTHER LAYERS OF LAKES OR IN STREAMS.

DHEC SAMPLED PROPORTIONATE NUMBERS OF EACH OF THE FIVE SPECIES TO ACCOUNT FOR VARIABILITY IN PCB LEVELS IN EACH SPECIES. FOR EXAMPLE, TEN SAMPLES OF EACH OF THE FIRST THREE SPECIES, AND TWO OF EACH CATFISH SPECIES ARE TAKEN AT EACH STATION. FEWER CATFISH ARE REQUIRED BECAUSE THEY HAVE SHOWN THE LEAST VARIABILITY IN STUDY FINDINGS. EACH OF THE FISH ARE STUDIED IN "MODIFIED WHOLE FORM", MINUS THE HEAD AND INTERNAL ORGANS. EXCEPT FOR THE CATFISH, WHICH HAVE TOUGH AND OFTEN UNPALATABLE SKIN, THE FISH ARE TESTED WITH THE SKIN ATTACHED. THE AGENCY USES THIS APPROACH FOR TWO REASONS.

FIRST, TESTING THE WHOLE FISH, INCLUDING THE SKIN, PROVIDES A MORE COMPLETE COUNT OF PCBS THAN WOULD TESTING FILLETS. SINCE PEOPLE COMMONLY EAT FISH AS FILLETS, WITHOUT THE SKIN, THIS TESTING PROCEDURE PROVIDES AN ADDED MARGIN OF SAFETY FOR PUBLIC HEALTH. SECOND, DHEC'S METHOD AVOIDS THE DATA VARIATIONS THAT RESULT FROM THE FILLETING PROCEDURES WHICH IS TRICKY. UNLESS EACH CUT IS EXACTLY THE SAME, THE AMOUNT OF FAT INCLUDED IN THE SAMPLE WILL VARY. FAT CELLS ARE PRIME "HOLDERS" OF PCB MOLECULES.

TO DATE, EVEN WITH REFINED RESEARCH METHODS, THE DATA OF PCB LEVELS AMONG FISH IN LAKE HARTWELL VARY. DHEC'S 1986 FINDINGS, FOR EXAMPLE, SHOWED THAT LARGE MOUTH BASS FROM THE TWELVE-MILE CREEK PORTION OF THE LAKE, RANGING IN WEIGHT FROM 1.68 - 2.98 POUNDS, DEMONSTRATED A PCB RANGE OF 3.64 PPM TO 130 PPM. WHILE THE FISH STUDY CONTINUES, DHEC AND EPA ASSESS WHETHER THE FISH CONSUMPTION ADVISORY SHOULD REMAIN IN EFFECT. THE MOST CURRENT READINGS SHOW THAT FISH ABOVE HIGHWAY 24 REGISTER AVERAGE PCB LEVELS ABOVE THE FDA LIMIT, FROM 2.22 PP IN CRAPPIE TO 34.06 PPM IN LARGE MOUTH BASS. BELOW HIGHWAY 24, ONLY HYBRID BASS AND CATFISH EXHIBITED THE EXCESS LEVELS AT A RANGE OF 5.48 PPM AND 2.05 PPM, REFLECTIVELY. THE FISH CONSUMPTION ADVISORY REMAINS IN EFFECT. IT AND THE SAMPLING WILL CONTINUE UNTIL LEVELS FALL BELOW THE FDA TOLERANCE LIMIT.

BREAZEALE SITE

EPA AND SANGAMO ENTERED INTO AN ADMINISTRATIVE ORDER ON CONSENT ON AUGUST 11, 1986 FOR AN IMMEDIATE REMOVAL ACTION ON THE BREAZEALE SITE. IN ITS 103C NOTIFICATION, SANGAMO REPORTED DEPOSITING APPROXIMATELY 24,000 CUBIC FEET OF PCB WASTE FROM THE PLANT. PCB LEVELS AS HIGH AS 27,000 PPM WERE FOUND IN SOIL SAMPLES TAKEN BY EPA IN NOVEMBER 1985. TWO MOBILE HOMES WERE ON THE SITE, BUT ONLY ONE WAS OCCUPIED.

AS A RESULT OF THIS ORDER, THE RESIDENTS WERE RELOCATED, THE SURFACE DRAINAGE AT THE SITE WAS REROUTED, FENCING WAS CONSTRUCTED TO RESTRICT SITE ACCESS, AND A GEOTEXTILE LINER AND SOIL CAP WERE ADDED AS AN INTERIM MEASURE TO RETARD THE MIGRATION OF PCB CONTAMINATION.

NIX SITE

IN ITS 103C NOTIFICATION, SANGAMO REPORTED DEPOSITING APPROXIMATELY 10, 509 CUBIC YARDS OF PCB WASTE FROM THE PLANT. IN 1980, SANGAMO REMOVED A TOTAL (FROM THE MIX AND DODGENS SITES) OF 17,711 CUBIC YARDS OF PCB CONTAMINATED SOIL AND DEBRIS AND DISPOSED OF IT IN A LANDFILL ON THE SANGAMO PLANT PROPERTY.

DODGENS SITE

IN ITS 103C NOTIFICATION, SANGAMO REPORTED DEPOSITING APPROXIMATELY 6,822 CUBIC YARDS OF PCB WASTE FROM THE PLANT. IN 1980, SANGAMO REMOVED A TOTAL (FROM THE NIX AND DODGENS SITES) OF 17,711 CUBIC YARDS OF PCB CONTAMINATED SOIL AND DEBRIS AND DISPOSED OF IT IN A LANDFILL ON THE SANGAMO PLANT PROPERTY.

ON-SITE REMOVAL

IN 1989, DURING THE RI, AREA D ON THE PLANT PROPERTY WAS FOUND TO CONTAIN PCB LEVELS AS HIGH AS 77,800 PPM. EPA SUPERVISED THE REMOVAL OF 7,285 TONS OF PCB CONTAMINATED SOIL AND DEBRIS TO THE GSX PERMITTED RCRA LANDFILL IN PINEWOOD, SOUTH CAROLINA. IN ADDITION, 6,684 CAPACITORS OVER 3 POUNDS WERE TAKEN TO AN APPROVED FACILITY FOR INCINERATION.

#HCP
3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

INFORMATION REPOSITORIES FOR THIS SITE WERE ESTABLISHED IN THE PICKENS COUNTY LIBRARY SYSTEM (PICKENS AND EASLEY BRANCHES) AND THE R.M. COOPER LIBRARY AT CLEMSON UNIVERSITY IN CLEMSON, SOUTH CAROLINA. INFORMATION IS ALSO AVAILABLE IN ATLANTA, GEORGIA IN THE EPA REGION IV REGIONAL OFFICE. FACT SHEETS AND PRESS ADVISORIES WERE PREPARED PRIOR TO EACH PUBLIC MEETING.

A COMMUNITY RELATIONS PLAN IDENTIFYING A POSITIVE PUBLIC OUTREACH STRATEGY WAS DEVELOPED AT THE DIRECTION OF EPA REGION IV STAFF AND

SUBMITTED TO THE INFORMATION REPOSITORIES PRIOR TO THE START OF WORK AT THE SITE. A PUBLIC MEETING WAS HELD IN JUNE 1987 TO PRESENT THE RI/FS WORK PLAN TO THE PUBLIC.

FACT SHEETS UPDATING LOCAL CITIZENS ON ACTIVITIES AT THE SITE WERE ISSUED IN MAY 1987, FEBRUARY 1988, NOVEMBER 1988, DECEMBER 1989, JULY 1990 AND SEPTEMBER 1990. THE RI WAS SUMMARIZED IN THE DECEMBER 1989 FACT SHEET, AND AN OPPORTUNITY WAS PROVIDED FOR A PUBLIC MEETING. NO ONE REQUESTED THAT EPA CONDUCT A MEETING AT THAT TIME.

EPA HELD A PUBLIC MEETING JULY 10, 1990 AT THE PICKENS COUNTY SENIOR HIGH SCHOOL IN PICKENS, SOUTH CAROLINA TO PRESENT THE FEASIBILITY STUDY RESULTS AND THE EPA'S PROPOSED PLAN FOR THE SITE. EPA PLACED PUBLIC NOTICES OF THE MEETING IN THE GREENVILLE NEWS AND THE PICKENS COUNTY SENTINEL AND DISTRIBUTED FACT SHEETS DESCRIBING EPA'S PROPOSED PLAN TO

CITIZENS AND OFFICIALS NOTED ON EPA'S SITE MAILING LIST. IN ADDITION, EPA HELD A BRIEFING FOR LOCAL OFFICIALS PRIOR TO THE MEETING ON JULY 10, 1990.

EPA ALSO BRIEFED THE PICKENS COUNTY COUNCIL AT THEIR REGULARLY SCHEDULED MEETING ON SEPTEMBER 17, 1990. IN ADDITION, EPA HELD AN AVAILABILITY SESSION ON SEPTEMBER 20, 1990 IN LIBERTY, SOUTH CAROLINA. A SPECIALIST FROM EPA'S CINCINNATI, OHIO OFFICE PRESENTED INFORMATION ON THERMAL SEPARATION AND THEN EPA RESPONDED TO QUESTIONS AND COMMENTS FROM MEMBERS OF THE AUDIENCE.

TRANSCRIPTS OF ALL THE PUBLIC MEETINGS WERE MADE AVAILABLE TO THE PUBLIC THROUGH THE ADMINISTRATIVE RECORD FOR THE SITE.

#SROU
4.0 SCOPE AND ROLE OF OPERABLE UNIT

THIS RECORD OF DECISION ADDRESSES OPERABLE UNIT ONE OF THE SUBJECT SITE. OPERABLE UNIT ONE CONSISTS OF GROUNDWATER AND SOURCE CONTAMINATION AT THE PLANT SITE AND THE CROSS ROADS, NIX, BREAZEALE, DODGENS, JOHN TROTTER AND WELLBORN SITES. THIS ROD ADDRESSES THE PRINCIPLE THREATS POSED BY CONTAMINATION ASSOCIATED WITH OPERABLE UNIT ONE.

OPERABLE UNIT 2 CONSISTS OF THE TWELVE MILE CREEK BASIN AND LAKE HARTWELL. AN RI/FS USING FUND MONEY HAS BEEN INITIATED AT OPERABLE UNIT TWO AS OF SEPTEMBER 30, 1990.

#SSC
5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 BREAZEALE PROPERTY

A TOTAL OF TWENTY-FIVE WELLS HAVE BEEN INSTALLED AT THE SITE. THE MOST

RECENT WELLS, BRMW-2A, 3B, 4A, 8B, 12A, 13, 14, 14A AND 15 WERE INSTALLED AS A PART OF THE RI FROM MAY TO JULY 1988. FIFTEEN WELLS ARE WATER TABLE MONITORING WELLS. TOTAL DEPTHS RANGE FROM 17 TO 40 FEET BELOW LAND SURFACE. ONE WELL WAS DRILLED TO AN INTERMEDIATE DEPTH IN THE SAPROLITE AND EIGHT WELLS WERE DRILLED TO THE TOP OF BEDROCK. DEPTH TO TOP OF BEDROCK AS DETERMINED BY AUGER REFUSAL RANGES FROM 17 FEET BELOW LAND SURFACE AT BRMW-13 TO 87 FEET BELOW LAND SURFACE AT BRMW-2A. TWO WELLS WERE DRILLED 20 FEET INTO BEDROCK. WELLS BRMW-1 TO 15 ARE WATER TABLE MONITORING WELLS. WELL BRMW-5A IS AN INTERMEDIATE DEPTH WELL WITHIN THE SAPROLITE. MONITORING WELLS BRMW-2A, 3A, 4A, 5B, 8A, 12A AND 14A ARE DEEPER WELLS SCREENED ON TOP OF BEDROCK. WATER TABLE WELL BRMW-13 ALSO EXTENDS TO BEDROCK. WELLS BRMW-3B AND BRMW-8B ARE SCREENED FIFTEEN TO TWENTY FEET BELOW TOP OF BEDROCK AND MONITOR BEDROCK GROUNDWATER QUALITY. A TOTAL OF THIRTY-ONE (31) SOIL BORINGS HAVE BEEN INSTALLED AT THE BREAZEALE PROPERTY. TWELVE OF THESE BORINGS PENETRATED

WASTE MATERIAL AND WERE USED TO CHARACTERIZE THE WASTE AND DETERMINE ITS VERTICAL EXTENT. SEVENTEEN SOIL BORINGS WERE DRILLED ADJACENT TO THE AREA OF WASTE DEPOSITION TO VERIFY THE BOUNDARIES OF THE WASTE AND LATERAL EXTENT OF PCBS IN SUBSURFACE SOILS.

MOST OF THE SITE IS UNDERLAIN BY RESIDUAL SOILS AND SAPROLITE. RESIDUAL SOILS FOUND AT LAND SURFACE CONSIST PRIMARILY OF SANDY AND CLAYEY SILTS, SILTY CLAYS AND MINOR SILTY SANDS APPROXIMATELY 7 TO 12 FEET THICK. THE UNDERLYING SAPROLITE CONSISTS OF SANDS WITH VARIOUS AMOUNTS OF SILT, CLAY AND MICA. THE SOUTH AND SOUTHWEST PORTIONS OF THE SITE BORDERING WOLF CREEK ARE UNDERLAIN BY ALLUVIAL DEPOSITS. THESE DEPOSITS CONSIST OF INTERBEDDED SANDY, SILTY CLAYS AND SILTY, CLAYEY SANDS. THE ALLUVIUM HAS A THICKNESS OF APPROXIMATELY 20 FEET AND IS UNDERLAIN BY SANDY SAPROLITE.

GROUNDWATER FLOW DIRECTION IS SOUTH-SOUTHWESTWARD TOWARDS WOLF CREEK. THE HORIZONTAL GROUNDWATER GRADIENT FOR MOST OF THE SITE (INCLUDING THE AREA OF WASTE DEPOSITION) IS 0.05 FEET PER FOOT. IN THE SOUTH TO SOUTHEASTERN PORTION OF THE SITE (IN THE FLOOD PLAIN DEPOSITS) THE GRADIENT IS ABOUT 0.01 FEET PER FOOT.

PRIOR TO THE INSTALLATION OF THE GEOTEXTILE LINER AND SOIL CAP (IN JULY AND AUGUST 1987) CAPACITOR DEBRIS WAS EXPOSED AT THE LAND SURFACE. WASTE (SOIL FILL WITH CAPACITOR DEBRIS) IS IN A TRENCH RANGING IN DEPTH FROM 2.5 FEET BELOW THE SOIL CAP AT BORING W-2 TO 11.5 FEET BELOW THE SOIL CAP AT W-10. THE AREA OF WASTE DEPOSITION IS 200 FEET LONG AND 50 FEET WIDE WITH AN AREA OF ABOUT 110 SQUARE YARDS. TOTAL WASTE VOLUME AT THE SITE IS ESTIMATED TO BE 2,500 CUBIC YARDS.

TEN SURFACE WASTE SAMPLES WERE COLLECTED AT SITES WI THROUGH W-10 AND ANALYZED FOR PCBS. PCB CONCENTRATIONS RANGE FROM 1.93 PPM AT W-1 TO 1800 PPM IN THE DUPLICATE SAMPLE OF W-5. ANALYTICAL RESULTS FOR THE SURFACE WASTE IS PRESENTED IN TABLE 5-1.

ONE WASTE SAMPLE EACH WAS COLLECTED FROM SOIL/WASTE BORINGS W-2 THROUGH

10 (A TOTAL OF NINE SAMPLES) AND WERE ANALYZED FOR PCBS. ANALYTICAL RESULTS FOR WASTE SAMPLES ARE INCLUDED IN TABLE 5-1. SUBSURFACE PCB CONCENTRATIONS RANGED FROM 3.7 PPM, IN SAMPLE W-9 (5.5-7 FEET), TO 1010 PPM IN SAMPLE W-7 (4-5.5 FEET).

SOIL/WASTE BORINGS W-11, 12 AND 13 WERE ADVANCED THROUGH THE WASTE INTO THE UNDERLYING SOILS. SPLIT SPOON SAMPLES WERE COLLECTED CONTINUOUSLY. WASTE SAMPLES COLLECTED FROM EACH BORING WERE COMBINED INTO A SINGLE COMPOSITE WASTE SAMPLE, WHICH WAS THEN ANALYZED FOR THE PRIORITY POLLUTANTS. ANALYTICAL RESULTS ARE INCLUDED IN TABLE 5-1. TRICHLOROETHENE AND TETRACHLOROETHENE WERE DETECTED AT 0.0039 PPM AND 0.0058 PPM, RESPECTIVELY.

A LEACHING PROCEDURE (EP TOXICITY TEST) WAS PERFORMED ON THE COMPOSITE WASTE SAMPLE FROM W-11, 12, 13 AND THE EXTRACT BEING ANALYZED FOR

PRIORITY POLLUTANT VOLATILE ORGANIC COMPOUNDS AND PCBS. THE ONLY PARAMETER DETECTED WAS PCB (AROCLOR 1248) WITH A CONCENTRATION OF 0.0311 PPM.

SUBSURFACE SOILS WERE ANALYZED TO DETERMINE THE EXTENT OF PCBS AND OTHER CONSTITUENTS BELOW THE LAND SURFACE ADJACENT TO AND BELOW THE WASTE. SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE.

FORTY-SIX SURFACE SOIL SAMPLES (BRSS-1 THROUGH 46) HAVE BEEN COLLECTED AT THE BREAZEALE SITE. ALL OF THE SAMPLES WERE ANALYZED FOR PCBS ONLY. TOTAL PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-2. TOTAL PCB CONCENTRATION RANGED FROM NONE DETECTED AT BRSS-5, 7, 12, 26, 42 AND 44 TO 8280 PPM AT BRSS-17.

A TOTAL OF THIRTY-EIGHT SUBSURFACE SOIL SAMPLES HAVE BEEN COLLECTED AT THE BREAZEALE SITE. BACKGROUND SOIL SAMPLE W-14 (0-17 FEET) AND THE COMPOSITE SAMPLE OF W-11, 12, 13 COLLECTED BELOW THE WASTE WERE ANALYZED FOR PRIORITY POLLUTANTS. AN EP TOXICITY TEST WAS PERFORMED ON A DUPLICATE SAMPLE FOR W-11, 12, 13 AND ANALYZED FOR PRIORITY POLLUTANT VOCS AND PCBS. SAMPLE BRSB-23 (10-12 FEET) COLLECTED ADJACENT SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS OF PCBS ARE PRESENTED IN TABLE 5-3.

TOTAL PCBS DETECTED BELOW THE WASTE RANGED FROM NONE DETECTED IN SAMPLES W-4 (5.5-7 FEET) AND W-5 (7-8.5 FEET) TO 65 PPM DETECTED IN W-9 (10-11.5 FEET).

TWENTY-FOUR SUBSURFACE SOIL SAMPLES WERE COLLECTED ADJACENT TO THE WASTE FROM BORINGS BRSB-15 THROUGH 26. AT LEAST TWO SAMPLES WERE COLLECTED FROM EACH BORING. TOTAL PCB CONCENTRATIONS DETECTED RANGED FROM 0.037 PPM IN BRSB-22 (3-4 FEET) TO 39 PPM DETECTED IN BRSB-24 (2-3 FEET). TOTAL PCB CONCENTRATIONS DECREASED WITH DEPTH IN EACH BORING, USUALLY TO BELOW DETECTION LIMITS.

TETRACHLOROETHENE WAS FOUND IN A CONCENTRATION OF 0.0029 PPM IN THE SOIL COMPOSITE FROM BORINGS W-11, 12 AND 13, COLLECTED DIRECTLY BELOW THE WASTE. NO VOCS WERE DETECTED IN THE EP TOXICITY TEST FOR W-11, 12, 13.

CONCENTRATIONS OF THE SEMI-VOLATILE ORGANIC, DI-N-BUTYL PHTHALATE, WERE DETECTED IN THE SOIL COMPOSITE OF BORINGS W-11 (12-22.5 FEET), 12 (3.5-20 FEET), 13 (12-18 FEET) AND THE SAMPLE FROM BORING W-14 (TABLE 5-4). BORING W-14 SERVES AS A SOURCE FOR BACKGROUND INFORMATION AS IT WAS INSTALLED OUTSIDE AND UPGRADIENT OF THE AREA OF WASTE DEPOSITION. SEVENTEEN INORGANIC COMPOUNDS WERE DETECTED IN SUBSURFACE SOILS.

PCBS WERE NOT DETECTED IN ANY OF THE WELLS. TETRACHLOROETHENE, TRICHLOROETHENE AND TOTAL 1,2-DICHLOROETHENE (INCLUDING TRANS 1,2-DICHLOROETHENE) WERE THE PRIMARY VOLATILE ORGANIC COMPOUNDS DETECTED. VOCS ARE MIGRATING EASTWARD TOWARD WELL BRMW-2 AND THEN

SOUTHWEST TOWARD WOLF CREEK. OF THE SEVEN WELL NESTS INSTALLED AT THE BREAZEALE SITE, FOUR (BRMW-2/2A, BRMW-3/3A, BRMW-4/4A, BRMW-5/5A/5B) DISPLAY A DECREASE IN VOC CONCENTRATIONS WITH DEPTH. THE PREDOMINANT TREND IS TO HAVE HIGHER VOC CONCENTRATIONS NEAR THE WATER TABLE SURFACE AND MUCH LOWER VOC CONCENTRATIONS IN THE DEEPER SAPROLITE AND BEDROCK; INDICATING THAT VOCS WITHIN THE GROUNDWATER ARE MIGRATING PRIMARILY HORIZONTALLY TOWARD WOLF CREEK.

SEMI-VOLATILE AND PESTICIDE ORGANIC COMPOUNDS WERE NOT DETECTED IN THE THREE WELLS (BRMW-3, 5 AND 11) THAT WERE ANALYZED FOR THESE PARAMETERS. ANALYTICAL RESULTS SUMMARIZING INORGANIC COMPOUNDS DETECTED IN BRMW-3, 5 AND 11 ARE IN TABLE 5-5. WELL BRMW-3 WAS ANALYZED FOR INORGANIC COMPOUNDS. ONLY CADMIUM AND NICKEL WERE FOUND IN WELL BBMW-3. NINE METALS WERE DETECTED IN THE NONFILTERED SAMPLE FOR BRMW-5. ONLY FIVE METALS (MAGNESIUM, MANGANESE, POTASSIUM, ZINC AND SODIUM) WERE IN THE FILTERED-SAMPLE FROM BBMW-5. EIGHT METALS WERE DETECTED IN THE NONFILTERED SAMPLE FOR BRMW-11. ONLY FOUR METALS (MAGNESIUM, MANGANESE, POTASSIUM AND ZINC) WERE DETECTED IN THE FILTERED SAMPLE FROM BRMW-11.

STREAM SEDIMENT SAMPLES WERE COLLECTED JULY 30, 1986 FROM TWO LOCATIONS (BRSD-1 AND 2) IN THE DITCH DRAINING THE EAST END OF THE SITE AND FROM THREE LOCATIONS (BRSD-3, 4 AND 5) LOCATED ON WOLF CREEK. SAMPLE SITE BRSD-3 IS LOCATED ON WOLF CREEK UPGRADIENT OF THE DRAINAGE DITCH AND THE SITE. BRSD-4 WAS COLLECTED FROM WOLF CREEK ADJACENT TO THE SITE AND BRSD-5 WAS COLLECTED FROM WOLF CREEK DOWNGRADIENT OF THE SITE. PCB ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-6.

PCBS WERE DETECTED IN SAMPLES BRSD-1 AND 2 AT TOTAL CONCENTRATIONS OF 0.32 PPM AND 1.8 PPM, RESPECTIVELY. NO PCBS WERE DETECTED IN SEDIMENT SAMPLES COLLECTED FROM WOLF CREEK. SEVERAL SURFACE WATER SAMPLES HAVE BEEN COLLECTED FROM THE DRAINAGE DITCH AND WOLF CREEK AT THE SAME LOCATIONS AS STREAM SEDIMENT SAMPLES. A SUMMARY OF DETECTED PARAMETERS IS PRESENTED IN TABLE 5-7. VOCS HAVE NOT BEEN DETECTED IN SAMPLES BRSW-1 AND 2. ONLY SMALL CONCENTRATIONS OF VOCS HAVE BEEN DETECTED IN SAMPLES COLLECTED FROM BRSW-3, 4 AND 5.

5.2 NIX SITE

A REMOVAL OF WASTE WAS CONDUCTED IN 1980. SOIL BORINGS WERE DRILLED TO DETERMINE THE HORIZONTAL AND VERTICAL EXTENT OF ANY REMAINING WASTE. NINE SOIL BORINGS WERE DRILLED AT LOCATIONS ON THE SITE. DEPTHS OF SOIL BORINGS RANGED FROM 3.7 TO 7.0 FEET BELOW LAND SURFACE. SOILS UNDERLYING THE NIX SITE ARE RESIDUAL IN NATURE AND CONSIST OF FINE TO COARSE GRAINED SILTY SAND AND CLAYEY SAND WITH ZONES OF SANDY SILT AND CLAYEY SILT.

DURING FIELD ACTIVITIES FOR THE REMEDIAL INVESTIGATION, AN AREA CONTAINING WASTE WAS IDENTIFIED ON THE SOUTH BANK OF THE RAVINE NEAR THE WEST END. THE WASTE AT THIS LOCATION INCLUDES FOIL-WRAPPED CAPACITORS, CAPACITOR PAPER AND FOIL FRAGMENTS. THIS WASTE COVERS A SURFACE AREA OF

ABOUT 50 SQUARE YARDS. TOTAL VOLUME OF THIS WASTE DEPOSIT IS APPROXIMATELY 20 CUBIC YARDS. DOMESTIC WASTE (FURNITURE PARTS AND OLD ROOFING SHINGLES) IS ALSO DISPOSED IN SEPARATE AREAS OF THE RAVINE.

CAPACITOR WASTE, INCLUDING FOIL-WRAPPED CAPACITORS, CAPACITOR PAPER AND FOIL FRAGMENTS, IS SCATTERED ON THE GROUND SURFACE WITHIN THE RAVINE AND ON THE LAND SURFACE 100 FEET TO EITHER SIDE OF THE RAVINE.

A SAMPLE OF WASTE WAS TAKEN FROM SOIL BORING NXSB-4, 0.7 TO 0.8 FEET BELOW LAND SURFACE. BECAUSE OF THE LIMITED VOLUME OF SAMPLE AT THIS SITE, SAMPLE NXSB-4 (0.7-0.8) WAS ANALYZED FOR VOCS ONLY. SAMPLE NXSS 22 WAS COLLECTED FROM WASTE PILED AT THE EAST SIDE OF THE RAVINE AND ANALYZED FOR THE HSL PARAMETERS. ANALYTICAL RESULTS FOR WASTE ARE PRESENTED ON TABLE 5-8. THE ONLY VOC DETECTED IN SAMPLE NXSB-4 (0.7-0.8) WAS METHYLENE CHLORIDE AT 0.008 PPM. SAMPLE NXSS-22 ALSO CONTAINED METHYLENE CHLORIDE AT 0.008 PPM.

NO SEMI-VOLATILE OR PESTICIDE COMPOUNDS WERE DETECTED. PCBS WERE DETECTED IN THE WASTE SAMPLE NXSS-22 AT A CONCENTRATION OF 13 PPM (AROCLOR 1254).

SEVENTEEN OF THE HSL INORGANIC COMPOUNDS WERE DETECTED IN THE WASTE SAMPLE NXSS-22.

SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE. TWENTY-ONE SURFACE SOIL SAMPLES (NXSS-1 THROUGH NXSS-21) WERE COLLECTED. NXSS-22 WAS AN HSL SAMPLE OF THE WASTE IN THE RAVINE AND IS NOT SURFACE SOIL. SAMPLES NXSS-1 TO 21 WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS ARE PRESENTED ON TABLE 5-9. PCBS WERE NOT DETECTED IN SIX SAMPLES. TOTAL DETECTED PCB CONCENTRATIONS RANGED FROM 0.130 PPM AT NXSS-2 TO 66 PPM AT NXSS-13.

SUBSURFACE SOILS WERE ANALYZED TO DETERMINE THE EXTENT OF PCBS AND OTHER CONSTITUENTS BELOW THE LAND SURF ACE AND BELOW WASTE. TEN SUBSURFACE SOIL SAMPLES WERE COLLECTED DURING THE REMEDIAL INVESTIGATION

ACTIVITIES. ONE OF THESE SAMPLES WAS A COMPOSITE COLLECTED FROM BERINGS NXSB-4, 4A AND 4B AND ANALYZED FOR THE HSL PARAMETERS, EXCEPT VOCS, WHICH WERE TAKEN FROM NXSB-4. THE NINE REMAINING SAMPLES WERE ANALYZED FOR PCBS ONLY. TABLE 5-10 PRESENTS RESULTS FOR PCB ANALYSIS OF SUBSURFACE SOILS. TABLE 5-11 PRESENTS THESE HSL PARAMETERS DETECTED IN COMPOSITE SAMPLE NXSB-4, 4A, 4B COLLECTED BELOW THE WASTE. THE COMPOUND STYRENE WAS DETECTED IN SOIL SAMPLE NXSB-4, 4A, 4B AT 0.009 PPM. FOURTEEN INORGANIC COMPOUNDS WERE DETECTED IN COMPOSITE SAMPLE NXSB-4, 4A, 4B AND ARE INCLUDED IN TABLE 5-11.

FOUR MONITORING WELLS (NXMW-1, 2, 3 AND 4) WERE INSTALLED AT THE NIX SITE. WELLS NXMW-2 AND NXMW-3 WERE INSTALLED IN THE SAPROLITE ABOVE BEDROCK. WELLS NXMW-1 AND NXMW-4 WERE INSTALLED INTO BEDROCK.

WELLS NXMW-1, 2 AND 3 ARE WATER TABLE WELLS. NXMW-1 IS LOCATED

UPGRADIENT OF THE SITE AND PROVIDES BACKGROUND GROUNDWATER QUALITY DATA. THE WATER TABLE AT WELL NXMW-1 OCCURS IN BEDROCK. LOCATIONS FOR NXMW-2 AND 3 WERE SELECTED TO MONITOR GROUNDWATER QUALITY ON EITHER SIDE OF THE RAVINE, DOWNGRADIENT OF PAST WASTE DISPOSAL AREAS AND PRESENT SCATTERED WASTE. IN THE AREA OF WELL NXMW-4, THE WATER TABLE IS WITHIN TWO FEET OF THE GROUND SURFACE AND THE TOP OF BEDROCK IS ONLY THREE TO FOUR FEET BELOW LAND SURFACE. FOR THIS REASON, A WATER TABLE WELL COULD NOT BE INSTALLED. THEREFORE, WELL NXMW-4 WAS INSTALLED INTO ROCK AND MONITORS BEDROCK WATER CONDITIONS DIRECTLY DOWNGRADIENT OF THE RAVINE.

GROUNDWATER SAMPLES WERE COLLECTED FROM MONITORING WELLS NXMW-1,2,3 AND 4 ON SEPTEMBER 8 AND 9, 1988 AND DECEMBER 6, 1988. FIRST ROUND SAMPLES WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. WELL NXMW-3 WAS ALSO ANALYZED FOR ALL OF THE HSL PARAMETERS. BOTH FILTERED AND NON-FILTERED SAMPLES WERE COLLECTED FOR INORGANIC ANALYSIS. SECOND ROUND SAMPLES WERE ANALYZED FOR PCBS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES AND SULFATE. TABLE 5-12 SUMMARIZES RESULTS FOR DETECTED PARAMETERS.

PCBS WERE NOT DETECTED IN ANY OF THE WELLS DURING BOTH SAMPLING ROUNDS. VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN THE FIRST ROUND GROUNDWATER SAMPLE FOR WELL NXMW-4.

SEMI-VOLATILE AND PESTICIDE ORGANIC COMPOUNDS WERE NOT DETECTED IN THE HSL ANALYSIS OF WELL NXMW-3. SAMPLES WERE OBTAINED FROM WELL NXMW-3 FOR INORGANIC ANALYSIS. TEN INORGANIC COMPOUNDS WERE DETECTED IN THE SAMPLE.

STREAM SEDIMENT SAMPLES WERE COLLECTED FROM 12 LOCATIONS. SEDIMENT SAMPLE LOCATION NXSD-1 WAS CHOSEN TO DETERMINE PCB CONCENTRATIONS IN SEDIMENTS IN THE EASTERN PORTION OF THE RAVINE. SAMPLE LOCATION NXSD-2 IS LOCATED ADJACENT TO THE AREA OF WASTE DEPOSITION NEAR THE WESTERN END OF THE RAVINE AND PROVIDES PCB CONCENTRATIONS IN SEDIMENTS IN THE DOWNGRADIENT AREA OF THE RAVINE. NXSD-3 AND 4 ARE LOCATED IN THE MARSH

IMMEDIATELY DOWNGRADIENT OF THE RAVINE. SEDIMENT SAMPLING LOCATIONS NXSD-4,6,7 AND 8 ARE LOCATED IN VARIOUS AREAS OF THE POND. SAMPLING LOCATIONS FOR NXSB-9 AND 10 ARE LOCATED IN TWO OUTFALL STREAMS DOWNGRADIENT OF THE POND. NXSB-11 IS LOCATED IN THE UNNAMED TRIBUTARY TO WOLF CREEK UPGRADIENT OF THE SITE. THE SAMPLING LOCATION FOR NXSD-12 IS LOCATED ON THE UNNAMED TRIBUTARY TO WOLF CREEK DOWNGRADIENT OF THE SITE. THESE SAMPLES WERE ANALYZED FOR PCBS TO DETERMINE THE PRESENCE AND EXTENT OF PCB MIGRATION ALONG SURFACE DRAINAGE ROUTES. ANALYTICAL RESULTS ARE PRESENTED ON TABLE 5-13.

PCBS WERE NOT DETECTED IN SEDIMENT SAMPLE NXSD-1 LOCATED IN THE UPGRADIENT PORTION OF THE RAVINE. TOTAL PCB CONCENTRATION AT NXSD-2 WAS 3.9 PPM. SEDIMENT SAMPLES NXSD-3 AND 4, HAD TOTAL PCB CONCENTRATIONS OF 1.74 AND 1.62 PPM, RESPECTIVELY. PCB CONCENTRATIONS IN THE SEDIMENT SAMPLES NXSD-5, 6, 7 AND 8 RANGED FROM 0.79 PPM AT NXSD-8 TO 1.56 PPM AT

NXSD-8. OF THE TWO SEDIMENT SAMPLES TAKEN FROM THE POND OUTFALL STREAMS (NXSD-9 AND NXSD-10), PCBS WERE ONLY DETECTED IN NXSD-9 AT 0.65 PPM. THERE WERE NO PCBS DETECTED AT NXSD-11 AND NXSW-12 LOCATED ON THE UNNAMED TRIBUTARY TO WOLF CREEK LOCATED UP AND DOWNGRADIENT RESPECTIVELY AT THE NIX SITE.

ONE ROUND OF SURFACE WATER SAMPLES WAS COLLECTED AT SAMPLES SITES NXSW-2,4,6,9 10,11 AND 12. A SURFACE WATER SAMPLE FROM THE SEDIMENT SAMPLE LOCATION NXSD-1 WAS PROPOSED IN THE RI WORK PLAN. HOWEVER, THERE WAS NO WATER AT NXSD-1 AT THE TIME OF SAMPLING AND A SURFACE WATER SAMPLE COULD NOT BE OBTAINED. SURFACE WATER SAMPLES WERE ANALYZED FOR PCBS, PH AND SPECIFIC CONDUCTANCE.

PCBS WERE NOT DETECTED IN ANY OF THE SURFACE WATER SAMPLES.

5.3 DODGENS SITE

TWENTY-FOUR SOIL BORINGS WERE DRILLED IN LOCATIONS ON THE DODGENS SITE. SOILS UNDERLYING THE DODGENS SITE CONSIST OF SILTY SANDS, SILTY CLAYS AND CLAYEY SILTS. THIN LAYERS OF CAPACITOR DEBRIS (CAPACITOR PAPER, FOIL) WERE PRESENT IN SOME BORINGS AT SHALLOW DEPTHS (LESS THAN THREE FEET BELOW LAND SURFACE). SOIL BORINGS AND EXPLORATORY BORINGS WERE DRILLED AS PART OF THE REMEDIAL INVESTIGATION TO CONFIRM ACTUAL WASTE PRESENCE AND DETERMINE HORIZONTAL AND VERTICAL EXTENT OF THE AREA OF WASTE DEPOSITION. WASTE SAMPLES WERE ANALYZED TO CHARACTERIZE THE WASTE AND IDENTIFY THE CONSTITUENTS TO BE ADDRESSED FURTHER.

WASTE WAS PENETRATED BY BORINGS DGSB-1, 3, 3C, 4A, 4C, SC AND 6. FOLLOWING INSTALLATION OF THE SOIL BORINGS, FIFTY-THREE EXPLORATORY BORINGS WERE DRILLED TO FURTHER DEFINE THE AREA OF WASTE DEPOSITION. WASTE, IN THE FORM OF CAPACITOR DEBRIS (FOIL, PAPER AND MICA PLATES), IS PRESENT IN SIX AREAS THROUGHOUT THE DODGENS SITE. THE SMALLEST AREA, LOCATED AT THE SOUTH END OF THE SITE HAS AN APPROXIMATE AREA OF 20 SQUARE YARDS. THE LARGEST AREA, LOCATED AT THE NORTHEAST END OF THE SITE, HAS AN APPROXIMATE AREA OF 395 CUBIC YARDS.

WASTE THICKNESS RANGES FROM TRACES (LT 0.1 FOOT) AT BORINGS DGEB-21, 26, 38 AND 49 TO 1.0 FEET AT DGEB-50. TOTAL WASTE VOLUME AT THE SITE IS ESTIMATED TO BE APPROXIMATELY 100 CUBIC YARDS.

A SAMPLE OF WASTE COLLECTED FROM SOIL BORING DGSB-4C AT 0.5 TO 2.0 FEET BELOW LAND SURFACE DESIGNATED DGSB-4C (0.5-2.0 FEET) AND A COMPOSITE SAMPLE OF WASTE COLLECTED FROM SOIL BORINGS 1, 3C AND 6 DESIGNATED DGSB-1, 3C, 6 WERE ANALYZED FOR THE HSL PARAMETERS (VOC SAMPLES FOR WASTE COLLECTED FROM BORINGS DGSB-1, 3C AND 6 WERE ANALYZED SEPARATELY AND NOT COMPOSITED). ANALYTICAL RESULTS FOR WASTE ARE PRESENTED IN TABLE 5-14 AND THE UPGRADIENT SURFACE SOIL SAMPLE DGSS-1 RESULTS ARE PRESENTED IN TABLE 5-15.

FOURTEEN SEMI-VOLATILE COMPOUNDS WERE DETECTED IN THE COMPOSITE WASTE

SAMPLE DGSB-1, 3C, 6. PCBS WERE DETECTED IN WASTE SAMPLE DGSB-1, 3C, 6 AND DGSB-4C (0.5-2-2.0 FEET). TOTAL PCBS DETECTED IN COMPOSITE WASTE SAMPLE DGSB-1, 3C, 6 WAS 470 PPM. TOTAL PCBS FOUND IN WASTE SAMPLE DGSB-4C (0.5-2.0 FEET) WAS 30 PPM.

THE INORGANIC, CADMIUM, COPPER, IRON, LEAD, MANGANESE, MERCURY, SILVER, VANADIUM AND ZINC WERE FOUND IN THE WASTE. SUBSURFACE SOILS WERE ANALYZED TO DETERMINE THE EXTENT OF PCBS AND OTHER CONSTITUENTS BELOW THE LAND SURFACE AND BELOW THE WASTE. SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE.

SURFACE SOIL-SAMPLES (DGSS-1 THROUGH DGSS-19) WERE COLLECTED AT VARIOUS LOCATIONS ON THE SITE. DGSS-1 WAS ANALYZED TO DETERMINE THE EXTENT OF PCBS AND OTHER CONSTITUENTS BELOW THE LAND SURFACE AND BELOW THE WASTE. SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE.

DGSS-1 WAS ANALYZED FOR THE HSL PARAMETERS. ANALYTICAL RESULTS ARE PRESENTED ON TABLE 5-15. SAMPLES DGSS-2 THROUGH DGSS-18 WERE ANALYZED FOR PCBS ONLY. TOTAL PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-16. TOTAL PCB CONCENTRATIONS RANGED FROM 0.2 PPM AT DGSS-8 TO 270 PPM AT DGSS-19. IN ADDITION TO PCBS, UPGRADIENT SURFACE SOIL SAMPLE DGSS-1 HAD SEVERAL INORGANIC COMPOUNDS DETECTED.

IN ADDITION TO COMPOSITE WASTE SAMPLE DGSB-11 3C, 6 AND WASTE SAMPLE DGSB-4 (0.5-2.0 FEET), TWENTY-FOUR SUBSURFACE SOIL SAMPLES WERE ANALYZED. ONE SAMPLE DGSB-3C (6-10 FEET) WAS ANALYZED FOR THE HSL PARAMETERS. THE REMAINING TWENTY-FOUR SUBSURFACE SOIL SAMPLES WERE ANALYZED. ONE SAMPLE DGSB-3C (6-10 FEET) WAS ANALYZED FOR THE HSL PARAMETERS. THE REMAINING TWENTY-FIVE SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS OF PCBS ARE PRESENTED IN TABLE 5-17. ADDITIONAL PARAMETERS DETECTED IN THE HSL ANALYSIS OF SAMPLE DGSB-3C (6-10 FEET) ARE PRESENTED IN TABLE 5-18. THE INORGANIC COMPOUNDS MAGNESIUM AND SILVER, WERE DETECTED IN DGSB-3C (6-10 FEET). TOTAL PCBS

DETECTED IN THE WASTE WERE 30 PPM IN DGSB-4C (0.5-2.0 FEET) AND 470 PPM IN THE COMPOSITE WASTE SAMPLE DGSB-1, 3C AND 6.

THE HIGHEST CONCENTRATION OF PCBS, 2700 PPM, WAS DETECTED IN BORING DGSB-5 AT THE DEPTH INTERVAL 4-6 FEET BELOW LAND SURFACE. BORING DGSB-5C LOCATED WEST OF DGSB-5 HAD A CONCENTRATION OF 150 PPM IN THE SAMPLE COLLECTED 4 TO 6 FEET BELOW LAND SURFACE. SOIL SAMPLES COLLECTED FROM BORINGS DGSB-3C (3.0-4.5 FEET) AND DGSB-5A (4-6 FEET) HAD TOTAL PCB CONCENTRATION OF 53.7 PPM AND 55 PPM RESPECTIVELY. THE TOTAL PCB CONCENTRATION IN THE SOIL SAMPLE COLLECTED FROM DGSB-3C AT 6 TO 10 FEET BELOW LAND SURFACE WAS 0.4 PPM.

THE REMAINING TWENTY-ONE SOIL SAMPLES HAD PCB CONCENTRATIONS RANGING FROM NONDETECTED IN FIVE SAMPLES TO 22 PPM DETECTED IN A SAMPLE COLLECTED FROM BORING DGSB-1 (3.5-5.0 FEET). MULTIPLE SAMPLES (2 OR 3)

OF SOIL AND WASTE WERE OBTAINED FROM EACH OF FIVE SOIL BORINGS, DGSB-1, 3C, 4C, SC AND 6. SAMPLES COLLECTED FROM BORING DGSB-4C HAD DECREASING PCB CONCENTRATIONS WITH DEPTH. WASTE COLLECTED AT 0.5 TO 2 FEET BELOW LAND SURFACE (COMPOSITED WITH WASTE COLLECTED FROM BORINGS DGSB-1 AND 6) HAD A TOTAL PCB CONCENTRATION OF 30 PPM. NO PCBS WERE DETECTED IN THE SOIL SAMPLE COLLECTED BELOW THE WASTE AT 3.0 TO 4.5 FEET BELOW LAND SURFACE, AND 0.082 PPM TOTAL PCBS WERE DETECTED IN THE SOIL SAMPLE COLLECTED AT 5.5 TO 7.0 FEET BELOW LAND SURFACE. THE REMAINING FOUR BORE HOLES ALSO EXHIBITED DECREASES IN TOTAL PCB CONCENTRATIONS WITH DEPTH.

FIVE MONITORING WELLS WERE INSTALLED AT THE DODGENS SITE. FOUR WELLS (DGMW-1 THROUGH 4), ARE WATER TABLE MONITORING WELLS. WELL DGMW-3A IS A DEEPER WELL AND FORMS A WELL PAIR WITH DGMW-3.

THE DODGENS SITE IS SITUATED ON FLOOD PLAIN DEPOSITS OF MIDDLE FORK TWELVE-MILE CREEK. THESE DEPOSITS EXTEND FROM LAND SURFACE TO DEPTHS RANGING FROM NINE FEET BELOW LAND SURFACE AT WELL DGMW-4 TO 18 FEET BELOW LAND SURFACE OF WELL DGMW-3A.

WELLS DGMW-1, 2, 3, AND 4 ARE WATER TABLE MONITORING WELLS. DGMW-1 IS LOCATED UPGRADIENT OF THE SITE AND PROVIDES BACKGROUND GROUNDWATER QUALITY DATA. WELLS DGMW-2, 3 AND 4 MONITOR GROUNDWATER IMMEDIATELY DOWNGRADIENT OF THE AREAS OF PAST AND PRESENT WASTE DEPOSITION. WELL DGMW-3A IS A DEEPER WELL SCREENED ON TOP OF BEDROCK AND IS LOCATED ADJACENT TO WELL DGMW-3. WELL DGMW-3A MONITORS DEEPER GROUNDWATER OF THE AREA OF WASTE DEPOSITION. THE WATER TABLE RANGES FROM FIVE TO SEVEN FEET BELOW LAND SURFACE.

FIRST ROUND SAMPLES WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES AND SULFATE. BECAUSE SEVERAL SEMI-VOLATILE COMPOUNDS WERE DETECTED IN THE HSL ANALYSIS OF COMPOSITE WASTE SAMPLE DGSB-1, 3C, 6, FIRST ROUND GROUNDWATER SAMPLES WERE ALSO ANALYZED FOR SEMI-VOLATILE COMPOUNDS. WELL DGMW-3 WAS ALSO ANALYZED FOR ALL OF THE HSL PARAMETERS DURING THE

FIRST ROUND SAMPLING. BOTH FILTERED AND NON-FILTERED SAMPLES WERE COLLECTED FOR INORGANIC ANALYSIS. TABLE 5-19 SUMMARIZES ANALYTICAL RESULTS FOR DETECTED PARAMETERS.

NO VOLATILE ORGANIC COMPOUNDS (VOCS) WERE DETECTED IN GROUNDWATER DURING THE FIRST SAMPLING ROUND IN AUGUST 1988; HOWEVER, VOCS WERE DETECTED IN GROUNDWATER COLLECTED FROM WELLS DGMW-2, 3 AND 4 IN THE SECOND ROUND. TRICHLOROETHENE WAS DETECTED IN WELLS DGMW-2 AND 3 AT CONCENTRATION OF 0.012 PPM AND 0.019 PPM, RESPECTIVELY. TETRACHLOROETHENE WAS DETECTED IN GROUNDWATER COLLECTED FROM WELLS DGMW-2, 3 AND 4 AT CONCENTRATIONS OF 0.005 PPM, 0.005 PPM AND 0.006 PPM, RESPECTIVELY. DURING THE FIRST SAMPLING ROUND, ALL FIVE WELLS WERE ANALYZED FOR THE SEMI-VOLATILE COMPOUNDS. BIS(2-ETHYLHEXYL)-PHTHALATE WAS DETECTED IN WELLS DGMW-1, 3 AND 3A AT CONCENTRATIONS OF 0.011 PPM, 0.012 PPM, AND 0.013 PPM, RESPECTIVELY: DI-N-OCTYLPHTHALATE WAS DETECTED IN THE GROUNDWATER SAMPLE

COLLECTED FROM WELL DGMW-3A AT A CONCENTRATION OF 0.012 PPM. DURING THE FIRST SAMPLING ROUND, SAMPLES WERE OBTAINED FROM DOWNGRADIENT WELL DGMW-3 FOR INORGANIC ANALYSIS. TWELVE INORGANIC COMPOUNDS WERE DETECTED IN THE SAMPLE.

STREAM SEDIMENT SAMPLES WERE COLLECTED FROM SIX LOCATIONS ON MIDDLE FORD TWELVE-MILE CREEK AND ITS TRIBUTARIES. SAMPLES WERE ANALYZED FOR PCBS. SEDIMENT SAMPLING ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-20. SAMPLING SITE DGSD-1 IS LOCATED ON MIDDLE FORK TWELVE-MILE CREEK UPSTREAM OF THE DODGENS SITE AND PROVIDES BACKGROUND STREAM SEDIMENT QUALITY. SAMPLE SITE DGSD-2 IS LOCATED ON MIDDLE FORK TWELVE-MILE CREEK ADJACENT TO THE SOUTHEAST CORNER OF THE SITE AND UPGRADIENT TO THE UNNAMED TRIBUTARY BORDERING THE SITE TO THE SOUTH. THIS SAMPLE WAS COLLECTED TO DETERMINE PCB CONCENTRATIONS DOWNGRADIENT OF THE SITE, BUT UPGRADIENT OF THE UNNAMED TRIBUTARY. SAMPLE SITE DGSD-3 IS LOCATED ON THE UNNAMED TRIBUTARY UPSTREAM OF THE POND OUTFALL. SAMPLE SITE DGSD-4 IS LOCATED ON THE UNNAMED TRIBUTARY DOWNSTREAM IN THE SEDIMENT AS A RESULT OF THE POND DISCHARGE. SAMPLE SITE DGSD-5 IS LOCATED ON MIDDLE FORK TWELVE-MILE CREEK DOWNSTREAM OF THE UNNAMED TRIBUTARY AND WAS SAMPLED TO DETERMINE IF PCBS ARE PRESENT DOWNGRADIENT OF ALL SITE DRAINAGE. SEDIMENT SAMPLE SITE DGSD-6 IS LOCATED ON THE POND LOCATED NEAR THE SOUTH END OF THE SITE.

NO PCBS WERE DETECTED IN UPSTREAM SEDIMENT SAMPLE DGSD-1. TOTAL PCB CONCENTRATIONS OF 1.0 PPM AND 0.36 PPM (DUPLICATE) WERE DETECTED IN SEDIMENT SAMPLE DGSD-2. THIS SAMPLE SITE IS LOCATED AT A POINT WHERE SURFACE WATER RUNOFF FROM THE SITE DISCHARGES INTO MIDDLE FORK TWELVE-MILE CREEK. NO PCBS WERE DETECTED IN SAMPLE DGSD-5 LOCATED FURTHER DOWNSTREAM. NO PCBS WERE DETECTED AT DGSD-3 AND DGSD-4 LOCATED ON THE UNNAMED TRIBUTARY. A TOTAL PCB CONCENTRATION OF 2.31 PPM WAS DETECTED IN SEDIMENTS IN THE POND (DGSD-6).

ONE ROUND OF SURFACE WATER SAMPLES WERE COLLECTED AT SAMPLE SITES DGSW-1 THROUGH 6. THESE SAMPLE POINTS CORRESPOND WITH SEDIMENT SAMPLE POINTS DGSD-1 THROUGH 6. SAMPLES WERE ANALYZED FOR PCBS AND SEMI-VOLATILE

COMPOUNDS PH AND SPECIFIC CONDUCTANCE. A SUMMARY OF DETECTED PARAMETERS ARE PRESENTED IN TABLE 5-21.

NO PCBS WERE DETECTED IN ANY OF THE SURFACE WATER SAMPLES. NO SEMI-VOLATILE COMPOUNDS WERE DETECTED IN UPGRADIENT SURFACE WATER SAMPLE DGSW-1 AND SAMPLE DGSW-6 COLLECTED FROM THE POND. THE SEMI-VOLATILE COMPOUND BIS (2-ETHYLHEXYL) PHTHALATE WAS DETECTED IN DGSW-2, DGSW-3, DGSW-4, DGSW-5 AND THE DUPLICATE SAMPLE FOR DGSW-6.

5.4 CROSS ROADS SITE

SOILS AT THE CROSS ROADS SITE WERE CHARACTERIZED THROUGH EXAMINATION OF SOIL SAMPLES COLLECTED FROM MONITORING WELL BORINGS AND SOIL BORINGS. EIGHTEEN SOIL BORINGS WERE DRILLED TO DETERMINE THE VERTICAL EXTENT OF THE WASTE, TO CHARACTERIZE THE WASTE AND TO DETERMINE THE PRESENCE OF

WASTE CONSTITUENTS IN UNDERLYING SOILS. SOILS UNDERLYING THE CROSS ROADS SITE CONSIST OF SILTY SANDS AND SANDY SILTS WITH VARYING AMOUNTS OF CLAY. WASTE, IN THE FORM OF CAPACITORS AND CAPACITOR DEBRIS (PAPER, FOIL, AND MICA PLATES) WERE PENETRATED BY BORING CRSB-3, 4, 5, 7B AND 7C.

FOLLOWING THE INSTALLATION OF THE SOIL BORINGS, EIGHTEEN EXPLORATORY BORINGS WERE DRILLED TO FURTHER DETERMINE THE HORIZONTAL AND VERTICAL EXTENT OF THE AREA OF WASTE DEPOSITION. WASTE, IN THE FORM OF CAPACITORS AND CAPACITOR DEBRIS, IS PRESENT IN AN AREA NEAR THE SOUTHERN BORDER OF THE SITE. THIS AREA HAS AN APPROXIMATE AREA OF 1700 SQUARE YARDS.

THE NORTHERN EXTENT OF THE WASTE WAS NOT DETERMINED IN THE VICINITY OF EXPLORATORY BORING CREB-18. NORTH OF BORING CREB-18 IS HEAVILY WOODED AND PREVENTED MOVEMENT OF THE DRILL RIG.

AS SHOWN ON TABLES 5-22 AND 5-23, WASTE THICKNESS RANGED FROM APPROXIMATELY 0.1 FOOT AT BORINGS CREB-2 AND 18 TO 2.6 FEET AT CRSB-7C. DEPTH TO THE TOP OF WASTE RANGED FROM 0.2 TO 1.8 FEET BELOW LAND SURFACE. THE HORIZONTAL EXTENT OF THE AREAS OF WASTE DEPOSITION WERE USED ALONG WITH WASTE THICKNESS TO DETERMINE THE VOLUME OF WASTE PRESENT AT THE CROSS ROADS SITE. TOTAL VOLUME OF SANGAMO WESTON PROCESS WASTE AT THE SITE IS APPROXIMATELY 400 CUBIC YARDS.

A COMPOSITE SAMPLE WAS MADE OF WASTE COLLECTED FROM SOIL BORING CRSB-3, 5, 7B AND 7C AND WAS ANALYZED FOR THE HSL PARAMETERS (VOC SAMPLES FOR WASTE FROM BORINGS CRSB-3, 5 AND 7B WERE ANALYZED SEPARATELY AND NOT COMPOSITED. ADDITIONALLY, A SAMPLE OF WASTE WAS COLLECTED FROM BORING CRSB-4 AND ANALYZED FOR VOCS ONLY. ANALYTICAL RESULTS FOR WASTE ARE PRESENTED IN TABLE 5-24.

THE VOLATILE ORGANIC COMPOUNDS, TOTAL 1,2-DICHLOROETHENE AND TRICHLOROETHENE WERE DETECTED. NO SEMI-VOLATILE OR PESTICIDE COMPOUNDS WERE DETECTED IN THE COMPOSITE WASTE SAMPLE. PCBS WERE DETECTED IN THE

COMPOSITE WASTE SAMPLE CRSB-3, 5, 78, 7C WITH A TOTAL PCB CONCENTRATION OF 118 PPM.

THE INORGANIC COMPOUNDS, CADMIUM, ZINC AND CYANIDE WERE DETECTED.

SUBSURFACE SOILS WERE ANALYZED TO DETERMINE THE EXTENT OF PCBS AND OTHER CONSTITUENTS BELOW THE LAND SURFACE AND BELOW THE WASTE. SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE.

TWENTY-SEVEN SURFACE SOIL SAMPLES (CRSS-1 THROUGH CRSS-27) WERE COLLECTED. CRSS-1 WAS ANALYZED FOR THE HSL PARAMETERS. ANALYTICAL RESULTS ARE PRESENTED ON TABLE 5-25. SAMPLES CRSS-2 THROUGH CRSS-27 WERE ANALYZED FOR PCBS ONLY. TOTAL PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-26. SAMPLE CRSS-9, LOCATED IN THE SOUTH CENTRAL PORTION OF THE

AREA OF WASTE DEPOSITION HAD A TOTAL PCB CONCENTRATION OF 410 PPM.

IN ADDITION TO COMPOSITE WASTE SAMPLE CRSB-3, 5, 78, 7C AND WASTE SAMPLE CRSB-7B (1.7-2), TWENTY-SEVEN SUBSURFACE SOIL SAMPLES WERE ANALYZED. ONE SAMPLE, CRSB-4 (5-7), WAS ANALYZED FOR THE HSL PARAMETERS. THE REMAINING TWENTY-SIX SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS OF PCB CONCENTRATIONS ARE PRESENTED IN TABLE 5-27. ADDITIONAL PARAMETERS DETECTED IN THE HSL ANALYSIS OF SAMPLE CRSB-4 (5-7) ARE PRESENTED IN TABLE 5-28.

THE PESTICIDE HEPTACHLOR EPOXIDE WAS FOUND IN SAMPLE CRSB-4 (5-7) AT 0.01 PPM. PCB CONCENTRATIONS OF SUBSURFACE SAMPLES RANGED FROM NONE DETECTED IN NINETEEN SAMPLES TO 3.5 PPM DETECTED IN A SAMPLE COLLECTED FROM BORING CRWB-2 (0.0-1.5).

5.6 JOHN TROTTER SITE

TWENTY-EIGHT SOIL BORINGS WERE DRILLED IN LOCATIONS AT THE JOHN TROTTER SITE. SOILS UNDERLYING THE JOHN TROTTER SITE CONSIST OF SILTY SANDS, SILTY CLAYS AND CLAYEY SILTS. THIN LAYERS OF CAPACITOR WASTE (CAPACITOR PAPER, FOIL) WERE PRESENT IN SOME BORINGS AT SHALLOW DEPTHS (LESS THAN THREE FEET) BELOW LAND SURFACE. SOIL BORINGS AND EXPLORATORY BORINGS WERE DRILLED AS PART OF THE REMEDIAL INVESTIGATION TO CONFIRM ACTUAL WASTE PRESENCE AND DETERMINE HORIZONTAL AND VERTICAL EXTENT OF THE AREA OF WASTE DEPOSITION. WASTE SAMPLES WERE ANALYZED TO CHARACTERIZE THE WASTE AND IDENTIFY THE CONSTITUENTS.

WASTE WAS PENETRATED BY BORINGS JTSB-2, 2A, 3, 3A, 58, SC, AND SD. FOLLOWING INSTALLATION OF THE SOIL BORINGS, SIX EXPLORATORY BORINGS WERE DRILLED TO FURTHER DEFINE THE AREA OF WASTE DEPOSITION. WASTE WAS NOT ENCOUNTERED IN ANY OF THE EXPLORATORY BORINGS.

WASTE, IN THE FORM OF CAPACITOR FOIL AND PAPER, IS PRESENT IN TWO AREAS ON THE JOHN TROTTER SITE. THE LARGER OF THE TWO WASTE AREAS IS LOCATED

IN AN EMBANKMENT ALONG THE NORTH EDGE OF THE GRAVEL ROAD. THE WASTE AREA IS ABOUT 80 FEET LONG AND 15 FEET WIDE AND COMPRISES AN AREA OF ABOUT 135 SQUARE YARDS. WASTE THICKNESS AS INDICATED BY BORINGS JTSB-2, 2A, 3 AND 3A IS ABOUT 0.5 FEET WITH THE TOP OF WASTE ABOUT ONE FOOT BELOW LAND SURFACE. THE SECOND WASTE AREA IS LOCATED ABOUT 25 FEET NORTHEAST OF THE LARGER WASTE AREA IN A LOWER, FLAT TURNAROUND AREA FOR THE GARAGE. THE WASTE AREA IS APPROXIMATELY 18 FEET LONG AND 15 WIDE AND COMPRISES AN AREA OF ABOUT 270 SQUARE FEET WASTE THICKNESS AS INDICATED BY BORINGS JTSB-5B, 5C AND 5D WAS ABOUT 0.5 TO 1 FOOT WITH DEPTH TO THE TOP OF WASTE AT 1.5 TO 2 FEET BELOW LAND SURFACE. TOTAL WASTE VOLUME AT THE JOHN TROTTER SITE IS ESTIMATED TO BE APPROXIMATELY 100 CUBIC YARDS.

A COMPOSITE SAMPLE OF WASTE, COLLECTED FROM BORINGS JTSB-2A (1.0 TO 1.5 FEET BELOW LAND SURFACE), JTSB-3A (1.0 TO 1.5 FEET BELOW LAND SURFACE)

AND JTSB-5D (1.5 TO 1.9 FEET BELOW LAND SURFACE), DESIGNATED JTSB-2A, 3A, 5D WAS ANALYZED FOR HSL PARAMETERS (VOC SAMPLES OF WASTE COLLECTED FROM BORINGS JTSB-2, 3 AND 5B WERE ANALYZED SEPARATELY AND NOT COMPOSITED). ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-29.

TWO VOLATILE ORGANIC COMPOUNDS, TETRACHLOROETHENE AND TRICHLOROETHENE WERE DETECTED IN THE WASTE. PCBS WERE DETECTED IN THE COMPOSITE WASTE SAMPLE JTSB-2A, 3A, 5D AT A CONCENTRATION OF 750 PPM.

FIGHT INORGANIC COMPOUNDS, ANTIMONY, BARIUM, CADMIUM, COPPER, LEAD, SILVER, MERCURY AND ZINC WERE DETECTED AT CONCENTRATIONS ABOVE THE RANGE IN TABLE 5-30. BARIUM AND ZINC ARE WITHIN THE RANGE OF CONCENTRATIONS IN TABLE 5-31. ANTIMONY, CADMIUM AND SILVER ARE NOT INCLUDED IN TABLE 5-31. CHINE SHOP DEBRIS WAS PRESENT ON THE LAND SURFACE ADJACENT TO THE GARAGE.

THIRTY-SEVEN SURFACE SOILS SAMPLES (JTSS-1 THROUGH JTSS-37) WERE COLLECTED AT THE SITE. JTSS-1 WAS ANALYZED FOR THE HSL PARAMETERS. TABLE 5-32 SUMMARIZES PARAMETERS DETECTED IN JTSS-1. SAMPLES JTSS-2 THROUGH JTSS-37 WERE ANALYZED FOR VOCS AND PCBS ONLY. VOCS DETECTED ALONG WITH TOTAL PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-33.

PCBS WERE DETECTED IN THIRTY TWO OF THE THIRTY-SEVEN SURFACE SOIL SAMPLES COLLECTED. NO PCBS WERE DETECTED IN SAMPLES JTSS-1, 15, 21, 26 AND 35. TOTAL PCB CONCENTRATIONS RANGED FROM 0.053 PPM AT JTSS-24 TO 97 PPM AT JTSS-10. JTSS-10 AND JTSS-30, WITH TOTAL PCB CONCENTRATIONS OF 97 PPM AND 94 PPM, ARE THE ONLY SAMPLES TO EXCEED 50 PPM. THE REMAINING SAMPLES HAD PCB CONCENTRATIONS RANGING FROM 0.053 PPM TO 14 PPM.

IN ADDITION TO THE COMPOSITE WASTE SAMPLE JTSB-2A, 3A, 5D, THIRTY SUBSURFACE SOIL SAMPLES WERE ANALYZED. ONE SAMPLE, JTSB-5B (6.5-8.0 FEET) WAS ANALYZED FOR HSL PARAMETERS. THE REMAINING TWENTY-NINE SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-34. ADDITIONAL PARAMETER DETECTED IN THE HSL ANALYSIS OF SAMPLE JTSB-5B (6.5 - 8 FEET) ARE PRESENTED IN TABLE 5-35.

PCBS WERE DETECTED IN FIFTEEN OF THE THIRTY SAMPLES COLLECTED. JTSB-3 HAD A TOTAL PCB CONCENTRATION OF 120 PPM. THIS SAMPLE WAS COLLECTED BELOW THE LARGER WASTE AREA. THE 120 PPM TOTAL PCBS DETECTED IN JTSB-3 (5-6.5 FEET) IS MUCH LOWER THAN DETECTED IN THE OVERLYING WASTE (73 PPM).

COMPOSITE WASTE SAMPLE JTSB-2A, 3A, 5D COLLECTED FROM BOTH AREAS OF WASTE DEPOSITION HAD A TOTAL PCB CONCENTRATION OF 730 PPM. SOIL SAMPLES COLLECTED FROM BORINGS JTSB-3 AND JTSB-5B HAD VARYING PCB CONCENTRATIONS WITH DEPTH. JTSB-3 HAD A PCB CONCENTRATION OF 27 PPM AT 2.5 TO 4 FEET BELOW LAND SURFACE (1 TO 2.5 FEET BELOW THE BOTTOM OF WASTE) AND HAD A PCB CONCENTRATION OF 120 PPM AT 5 TO 6.5 FEET BELOW LAND SURFACE (3.5 TO 5 FEET BELOW THE BOTTOM OF WASTE). JTSB-5B HAD A PCB CONCENTRATION OF 0.42 PPM AT 4 TO 5.5 FEET BELOW LAND SURFACE (1 TO 2.5 FEET BELOW WASTE)

AND A CONCENTRATION OF 2.7 PPM AT 6.5 TO 8 FEET BELOW LAND SURFACE (3.5 TO 5 FEET BELOW WASTE).

GROUND WATER SAMPLES WERE COLLECTED FROM WELLS JTMW-1, 2, 3, 3A, 3B AND 4 IN NOVEMBER 1988 AND FEBRUARY 1989. SAMPLES FROM BOTH SAMPLING ROUNDS WERE ANALYZED FOR PCBS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES AND SULFATE. ADDITIONALLY, DURING THE FIRST SAMPLING ROUND ALL WELLS WERE SAMPLED FOR VOCS AND WELL JTMW-3 WAS ANALYZED FOR ALL OF THE HSL PARAMETERS. TABLE 5-36 SUMMARIZES ANALYTICAL RESULTS FOR DETECTED PARAMETERS.

NO PCBS WERE DETECTED IN ANY OF THE WELLS DURING EITHER SAMPLING EVENT.

DURING THE NOVEMBER 1988 SAMPLING, ONLY WELL JTMW-3 WAS ANALYZED FOR HSL PARAMETERS. NO SEMI-VOLATILE OR PESTICIDE COMPOUNDS WERE DETECTED. SEVENTEEN INORGANIC COMPOUNDS WERE FOUND IN THE SAMPLE. INORGANIC COMPOUND CONCENTRATIONS IN THE SAMPLE WERE LOW, THEREFORE, METALS WERE NOT INCLUDED IN THE ANALYTICAL PARAMETERS FOR THE SECOND ROUND OF GROUND WATER SAMPLES COLLECTED IN FEBRUARY 1989.

STREAM SEDIMENT SAMPLES WERE COLLECTED IN NOVEMBER 1988 FROM TWO LOCATIONS ON THE UNNAMED TRIBUTARY TO TOWN CREEK. SAMPLES WERE ANALYZED FOR PCBS AND VOLATILE ORGANIC COMPOUNDS. ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-37. SAMPLING SITE JTSD-1 IS LOCATED ON THE UNNAMED TRIBUTARY TO TOWN CREEK UPSTREAM OF THE JOHN TROTTER SITE AND PROVIDES BACKGROUND STREAM SEDIMENT QUALITY. SEDIMENT SAMPLING SITE JTSD-2 IS LOCATED ON THE UNNAMED TRIBUTARY DOWNSTREAM OF THE SITE AND WAS SAMPLED TO DETERMINE IF PCBS ARE PRESENT DOWNGRADIENT OF SITE DRAINAGE.

NO PCBS OR VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN UPSTREAM SEDIMENT SAMPLE JTSD-1. A PCB CONCENTRATION OF 0.092 PPM WAS DETECTED IN JTSD-2 DOWNSTREAM OF THE JOHN TROTTER SITE. THIS PCB CONCENTRATION PROBABLY OCCURRED AS A RESULT OF EROSION OF PCB BEARING SOILS WITH SURFACE WATER RUNOFF ON-SITE.

ONE ROUND OF SURFACE WATER SAMPLES WERE COLLECTED IN NOVEMBER 1988 AT SAMPLING SITES JTSW-1 AND 2. THESE SAMPLING POINTS CORRESPOND WITH AND SERVE THE SAME PURPOSE AS SEDIMENT SAMPLING POINTS JTSD-1 AND 2. SURFACE WATER SAMPLES WERE ANALYZED FOR VOCS AND PCBS. NO VOCS OR PCBS WERE DETECTED IN EITHER OF THE SURFACE WATER SAMPLES.

5.7 SANGAMO PLANT SITE

3.2.1 SOURCES

AREA A

SOIL BORINGS AND EXPLORATORY TRENCHES WERE INSTALLED AS PART OF THE REMEDIAL INVESTIGATION TO DETERMINE ACTUAL WASTE PRESENCE, AND HORIZONTAL AND VERTICAL EXTENT OF THE AREA OF WASTE DEPOSITION IN AREA

A.

NINE SOIL BORINGS WERE DRILLED IN AREA A. WASTE, IN THE FORM OF ALUMINUM HYDROXIDE SLUDGE, WAS PENETRATED BY BORINGS SASB-1, 2, 2A, 3, 3A AND 48. WASTE WAS NOT FOUND IN THE THREE REMAINING SOIL BORINGS, SASB-4, 4A AND 4C.

FOLLOWING INSTALLATION OF THE SOIL BORINGS, TWELVE EXPLORATORY TRENCHES, LABELED SAST-1 THROUGH 12, WERE EXCAVATED TO FURTHER DETERMINE THE HORIZONTAL AND VERTICAL EXTENT OF THE AREAS OF WASTE DEPOSITION. EXPLORATORY TRENCHES WERE EXCAVATED WITH A BACKHOE AND VISUALLY DESCRIBED BY THE ON-SITE RMT GEOLOGIST.

THE HORIZONTAL EXTENT OF WASTE WAS DETERMINED BY SOIL BORINGS AND EXPLORATORY TRENCHES. WASTE SLUDGE IS PRESENT IN TWO ADJACENT LOCATIONS AT AREA A. THE NORTHERN AREA OF WASTE DEPOSITION HAS A TOTAL AREA OF 280 SQUARE YARDS AND THE SOUTHERN HAS A TOTAL AREA OF 170 SQUARE YARDS. WASTE THICKNESS RANGES FROM 1 FOOT AT BORING SASB-3 TO 9 FEET ON THE WEST END OF TRENCH SAST-2.THE VOLUME OF WASTE PRESENT IN AREA A IS 500 CUBIC YARDS. WASTE VOLUME CALCULATIONS FOR ALL SITES WERE PRESENTED IN DETAIL IN THE FEASIBILITY STUDY.

TWO COMPOSITE SAMPLES OF WASTE WERE COLLECTED FROM AREA A AND ANALYZED FOR HSL PARAMETERS. ONE COMPOSITE SAMPLE WAS OBTAINED FROM SOIL BORINGS SASB-1 AND SASB-2A IN THE NORTHERN WASTE AREA, AND ONE COMPOSITE SAMPLE WAS OBTAINED FROM SOIL BORINGS SASB-3A AND SASB-4B IN THE SOUTHERN WASTE AREA. VOC SAMPLES FOR WASTE COLLECTED FROM BORINGS SASB-1, 3A, 3A AND 4B WERE ANALYZED SEPARATELY AND NOT COMPOSITED. ANALYTICAL RESULTS FOR WASTE ARE PRESENTED IN TABLE 5-38.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED. THE VOLATILE ORGANIC COMPOUNDS METHYLENE CHLORIDE AND ACETONE WERE DETECTED IN MOST SAMPLES COLLECTED (WASTE, SOILS, SEDIMENTS AND WATER) AT ALL OF THE SITES. CARBON DISULFIDE WAS ALSO DETECTED IN SEVERAL SAMPLES AT SOME OF THE OFF SITE AREAS.

ONLY FOUR OF THE WASTE SAMPLES HAD VOCS OTHER THAN METHYLENE CHLORIDE OR ACETONE. THESE CONCENTRATIONS WERE ALL LESS THAN 1 PPM. THESE COMPOUNDS WERE NOT DETECTED IN ANY OF THE OTHER WASTE SAMPLES. VOCS WERE NOT DETECTED IN WASTE COLLECTED FORM THE NORTH WASTE AREA.

PCBS WERE FOUND IN BOTH OF THE COMPOSITE WASTE SAMPLES, SASB-1, 2A AND SASB-3A, 4B. TOTAL PCB CONCENTRATION IN SASB-1, 2A WAS 17.4 PPM. SAMPLE SASB-3A, 4B HAD A TOTAL PCS CONCENTRATION OF 22,900 PPM. AS THE SLUDGE IS FROM THE WASTEWATER TREATMENT FACILITY, THIS IS EXPECTED.

TABLE 5-34 PRESENTS HSL INORGANIC COMPOUND CONCENTRATIONS DETECTED IN UPGRADIENT SURFACE SOILS FOR ALL OF THE SITES AND AREAS ADDRESSED IN THE REMEDIAL INVESTIGATION. TABLE 5-31 PRESENTS THE RANGE OF SELECTED INORGANIC COMPOUNDS DETECTED IN SOILS IN GEORGIA, SOUTH CAROLINA AND

NORTH CAROLINA OBTAINED FROM "CHEMICAL ANALYSES OF SOILS AND OTHER SURFICIAL MATERIALS OF THE CONTERMINOUS UNITED STATES" (USGS, 1981). THE RANGE OF CONCENTRATIONS ON TABLES 5-30 AND 5-31 ARE USED FOR COMPARISON WITH DOWNGRADIENT WASTE AND SOIL SAMPLES FOR EACH SITE OR AREA.

THE INORGANIC COMPOUNDS ALUMINUM, ARSENIC, COPPER MANGANESE AND SILVER WERE FOUND AT CONCENTRATIONS HIGHER THAN THE RANGE OF CONCENTRATIONS DETECTED IN THE UPGRADIENT SURFACE SOIL SAMPLES (TABLE 5-34). COPPER AND MANGANESE WERE BELOW THE RANGE FOR GA, SC AND NC (TABLE 5-31).

NINETEEN SURFACE SOIL SAMPLES (SASS-1 THROUGH SASS-19) WERE COLLECTED. SASS-1 WAS ANALYZED FOR THE HSL PARAMETERS. SAMPLES SASS-2 THROUGH SASS-19 WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS FOR SASS-1 ARE PRESENTED ON TABLE 5-39. PCB CONCENTRATIONS DETECTED IN ALL SURFACE SOIL SAMPLES ARE SUMMARIZED IN TABLE 5-40. PCBS WERE DETECTED IN NINETEEN SURFACE SOIL SAMPLES. TOTAL PCB CONCENTRATIONS RANGED FROM 2.4 PPM AT SASS-18 TO 1880 PPM AT SASS-12. THIRTEEN SURFACE SOIL SAMPLES INCLUDING UPGRADIENT SAMPLE SASS-1, EXCEEDED 50 PPM TOTAL PCBS. TEN OF THESE SAMPLES WERE COLLECTED IN THE IMMEDIATE VICINITY OF THE AREAS OF WASTE DEPOSITION. PCBS WERE ALSO DETECTED IN SURFACE SOIL SAMPLES COLLECTED DOWNGRADIENT AT AREA A, TWO OF WHICH EXCEEDED 50 PPM (SASS-16 AND SASS-19).

IN ADDITION TO COMPOSITE WASTE SAMPLES SASB-1, 2A AND SASB-3A, 4B, NINE SUBSURFACE SOIL SAMPLES WERE COLLECTED FROM BELOW OR ADJACENT WASTE, AND ANALYZED FOR PCBS. ADDITIONALLY, ONE SAMPLE COLLECTED BELOW THE WASTE FROM BORING SASB-3A, DESIGNATED SASB-3A (11-13), WAS ANALYZED FOR HSL PARAMETERS. ANALYTICAL RESULTS FOR PCBS ARE PRESENTED IN TABLE 5-41. ADDITIONAL PARAMETERS DETECTED IN THE HSL ANALYSIS OF SAMPLE SASB-3A (11-13) ARE PRESENTED IN TABLE 5-42. TOTAL PCB CONCENTRATIONS ARE ALSO SHOWN ON WASTE RANGED FROM 17.4 PPM IN COMPOSITE SASB-1, 2A, COLLECTED FROM THE NORTH WASTE AREA TO 22,900 PPM IN COMPOSITE SAMPLE SASB-3A, 4B COLLECTED FROM THE SOUTH WASTE AREA. ONLY FOUR SUBSURFACE SOIL SAMPLES, SASB-3 (8-0), SASB-3A (11-13), SASB-4A (4-6) AND SASB-4C (13-15) HAD PCB

CONCENTRATIONS EXCEEDING 50 PPM.

SOIL SAMPLE SASB-2 (6-8) COLLECTED ADJACENT TO THE NORTH WASTE AREA AND SAMPLES SASB-1 (6-8), SASB-1 (9-11), SASB-2A (6-8) AND SASB-2A (9-11), COLLECTED BELOW THE NORTH WASTE AREA HAD TOTAL PCB CONCENTRATIONS RANGING FROM 0.053 PPM TO 2.67 PPM (MUCH LOWER THAN THE 17 4 PPM DETECTED IN THE WASTE IN THE NORTH AREA). NONE OF THE WASTE OR SUBSURFACE SOIL SAMPLES COLLECTED AT THE NORTH WASTE AREA EXCEEDED 50 PPM TOTAL PCBS.

SUBSURFACE SOIL SAMPLE SASB-3A (11-13) COLLECTED BELOW THE WASTE IN THE SOUTH AREA WAS ANALYZED FOR HSS PARAMETERS. NO VOCS OR PESTICIDES WERE DETECTED. ONLY ONE SEMI-VOLATILE COMPOUND, BIS (2-ETHYLHEXYL) PHTHALATE, WAS DETECTED. ONE INORGANIC COMPOUND, COBALT, EXCEEDED THE RANGE OF CONCENTRATIONS ON TABLE 5-31. COBALT WAS DETECTED AT LOWER

CONCENTRATIONS IN THE WASTE. SILVER WAS DETECTED ABOVE THE RANGE OF CONCENTRATIONS IN TABLE 5-30.

SOIL SAMPLES WERE COLLECTED AT 0 TO 1.5 FEET AND 1.5 TO 3 FEET BELOW LAND SURFACE AT PROPOSED LOCATIONS FOR WELLS SAMW-2 AND SAMW-3 LOCATED ADJACENT TO THE SOUTH AREA OF WASTE DEPOSITION AND ANALYZED FOR PCBS. ANALYTICAL RESULTS ARE ALSO INCLUDED IN TABLE 5-41. TOTAL PCB CONCENTRATION RANGED FROM 13.1 PPM TO 340 PPM.

GROUND WATER SAMPLES WERE COLLECTED FROM ALL AREA A WELLS (SAMW-1, 2 AND 3). SAMPLES WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. IN ADDITION, WELL SAMW-3 WAS ANALYZED FOR ALL OF THE HSL PARAMETERS. SAMPLES WERE COLLECTED FOR INORGANIC ANALYSIS. TABLE 5-43 SUMMARIZES ANALYTICAL RESULTS FOR PARAMETERS DETECTED IN ALL SAMPLES.

NO PCBS WERE DETECTED IN ANY OF THE AREA A WELLS. TRICHLOROETHENE WAS DETECTED IN ALL THREE WELLS IN JANUARY 1989. TETRACHLOROETHENE WAS ALSO DETECTED IN ALL THREE WELLS AT SIMILAR CONCENTRATIONS, 0.005 PPM TO 0.007 PPM. TOTAL 1,2-DICHLOROETHENE WAS DETECTED IN WELL SAMW-3 AT 0.018 PPM IN OCTOBER 1988, AND 0.022 PPM IN JANUARY 1989.

SEMI-VOLATILE AND PESTICIDE COMPOUNDS WERE NOT DETECTED IN THE ONE HSL ANALYSIS OF SAMW-3.

DURING THE FIRST SAMPLING ROUND IN OCTOBER 1988, GROUND WATER SAMPLES WERE OBTAINED FROM WELL SAMW-3 AND ANALYZED FOR INORGANIC COMPOUNDS. METAL CONCENTRATIONS WERE LOW; THEREFORE, METALS WERE NOT INCLUDED IN THE ANALYTICAL PARAMETERS FOR THE SECOND ROUND OF GROUND WATER SAMPLES COLLECTED IN JANUARY 1989. EPA WAS NOTIFIED OF THE ELIMINATION OF METALS AND SEMI-VOLATILE COMPOUNDS FROM THE ANALYTICAL PARAMETER LIST IN A LETTER DATED JANUARY 10, 1989.

AREA B:

SOIL BORINGS, EXPLORATORY BORINGS, AND ONE EXPLORATORY TRENCH WERE INSTALLED AS PART OF THE REMEDIAL INVESTIGATION TO DETERMINE WASTE PRESENCE, AND TO INVESTIGATE THE HORIZONTAL AND VERTICAL EXTENT OF THE AREAS OF WASTE DEPOSITION. A TOTAL OF NINE SOIL BORINGS WERE DRILLED. WASTE IN THE FORM OF CAPACITOR DEBRIS, SLUDGE, RESINOUS MATERIAL, AND DRUMS WAS FOUND IN BORING SBSB-1, SBSB-2B AND SBSB-3A. NO WASTE WAS FOUND IN THE SIX REMAINING SOIL BORINGS.

FOLLOWING INSTALLATION OF THE SOIL BORINGS, FIVE EXPLORATORY BORINGS WERE INSTALLED TO FURTHER DETERMINE THE HORIZONTAL AND VERTICAL EXTENT OF WASTE DEPOSITION. AN EXPLORATORY TRENCHING PROGRAM WAS ALSO INITIATED TO FURTHER DEFINE THE WASTE IN AREA B. HOWEVER, DRUMS WERE ENCOUNTERED IN THE FIRST EXPLORATORY TRENCH (SBST-1) AND TRENCHING WAS DISCONTINUED IN ORDER TO AVOID PUNCTURING THE DRUMS. THE VERTICAL EXTENT OF WASTE HAS BEEN ESTIMATED. THE WASTE HAS BEEN DISPOSED IN

THREE AREAS: ONE ABOVE-GROUND DISPOSAL AREA AT THE NORTH END OF AREA 5, AND TWO SUBSURFACE DISPOSAL AREAS. WASTE IN THE ABOVE-GROUND DISPOSAL AREA CONSIST OF WOOD PALLETS AND CAPACITOR DEBRIS. THE ABOVE-GROUND WASTE AREA HAS AN APPROXIMATE SURFACE AREA OF 180 SQUARE YARDS. THE NORTH AREA OF SUBSURFACE WASTE HAS AN AREA OF 80 SQUARE YARDS AND AN ESTIMATED VOLUME OF 300 CUBIC YARDS. THE SOUTHERNMOST AREA OF WASTE DEPOSITION HAS A SURFACE AREA OF 95 SQUARE YARDS AND AN ESTIMATED VOLUME OF 250 CUBIC YARDS.

A SAMPLE OF WASTE COLLECTED FROM EXPLORATORY TRENCH SBST-1, AND A COMPOSITE SAMPLE OF WASTE COLLECTED FROM SOIL BORINGS 2B AND 3 (DESIGNATED SBSB-2B, 3), WERE ANALYZED FOR THE HSL PARAMETERS. SAMPLES OF WASTE FOR VOC ANALYSIS WERE COLLECTED FROM BORINGS SBSB-2B AND 3 AND ANALYZED SEPARATELY. ANALYTICAL RESULTS FOR WASTE ARE PRESENTED ON TABLE 5-44.

SEVERAL VOCS AND SEMI-VOLATILE COMPOUNDS WERE DETECTED IN THE WASTE. TRICHLOROETHENE AND TETRACHLOROETHENE WERE MOST COMMON. PCBS WERE DETECTED IN WASTE SAMPLES SBST-1 AND IN THE COMPOSITE SAMPLE SBSB-2B, 3. TOTAL PCBS DETECTED IN COMPOSITE WASTE SAMPLE SBSB-2B, 3, AND IN THE EXPLORATORY TRENCH WASTE SAMPLE WERE 31 PPM AND 920 PPM, RESPECTIVELY.

THE INORGANIC COMPOUNDS ALUMINUM, CALCIUM, LEAD, MAGNESIUM, SILVER AND CYANIDE WERE FOUND IN THE WASTE AT CONCENTRATIONS ABOVE THE RANGE DETECTED IN TABLE 5-30. LEAD AND MAGNESIUM CONCENTRATIONS ARE WITHIN THE RANGE IN TABLE 5-31.

TWENTY-TWO SURFACE SOIL SAMPLES, (SBSS-1 THROUGH SBSS-22), WERE COLLECTED IN AREA 5. UPGRADIENT SOIL SAMPLE SBSS-1 WAS ANALYZED FOR HSL PARAMETERS. THE REMAINING SAMPLES WERE ANALYZED FOR PCBS AND VOCS. TABLE 5-45 SUMMARIZES THOSE PARAMETERS DETECTED IN SBSS-1. PCB, SEMI-VOLATILES AND VOC CONCENTRATIONS FOR ALL SURFACE SOIL SAMPLES ARE PRESENT IN TABLE 5-46. PCBS WERE DETECTED IN TWENTY-TWO SAMPLES. TOTAL PCB CONCENTRATIONS RANGED FROM 0.53 PPM AT SBSS-3 TO 32,000 PPM AT SBSS-7. NINE SURFACE SOIL SAMPLES HAVE PCB CONCENTRATIONS EXCEEDING 50

PPM. EIGHT OF THESE SAMPLES ARE LOCATED AT AREAS OF WASTE DEPOSITION. SURFACE SOIL SAMPLES SBSS-4, 7, 9 AND 11 WERE COLLECTED ADJACENT TO OR IMMEDIATELY DOWNGRADIENT OF THE ABOVE-GROUND DISPOSAL AREA. SBSS-14 WAS COLLECTED ADJACENT TO THE NORTH SUBSURFACE DISPOSAL AREA. SURFACE SOIL SAMPLES SBSS-17, 18 AND 19 ARE ALL LOCATED IMMEDIATELY DOWNGRADIENT OF THE SOUTH DISPOSAL AREA. SURFACE SOIL SAMPLE SBSS-21 (325 PPM TOTAL PCBS) WAS COLLECTED FROM A DRAINAGE SWALE DOWNGRADIENT OF THE WASTE AREAS IN AREA B.

VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN SBSS-7, 11, 16 AND 18 THROUGH 21. SAMPLES SBSS-7 AND SBSS-6 WERE COLLECTED AT AND DOWNGRADIENT OF THE ABOVE-GROUND DISPOSAL AREA, RESPECTIVELY. SAMPLES SBSS-18, 19 AND 20 WERE COLLECTED IMMEDIATELY DOWNGRADIENT OF THE SOUTH SUBSURFACE DISPOSAL AREA. SAMPLE SBSS-21 WAS COLLECTED IN A DRAINAGE SWALE ABOUT FIFTY FEET DOWNGRADIENT OF THE WASTE IN AREA B. THE

CONCENTRATIONS OF VOCS ARE ALL LESS THAN 1 PPM.

IN ADDITION TO WASTE SAMPLES, FIVE SUBSURFACE SOIL SAMPLES WERE COLLECTED ADJACENT TO OR BELOW THE WASTE AND ANALYZED FOR PCBS. ADDITIONALLY, ONE SAMPLE, SBSB-2B (8-10) WAS ANALYZED FOR THE HSL PARAMETERS. ANALYTICAL RESULTS FOR PCBS ARE PRESENTED IN TABLE 5-47. PARAMETERS DETECTED IN THE HSL ANALYSIS OF SBSB-2B (8-10) ARE SUMMARIZED IN TABLE 5-48.

THREE BORINGS SBSB-1, 1A AND 1B WERE INSTALLED ADJACENT TO THE ABOVE-GROUND DISPOSAL AREA AND SAMPLED AT 4 TO 6 FEET BELOW LAND SURFACE. TOTAL PCB CONCENTRATIONS IN THESE SAMPLES WERE 16 PPM, 1.4 PPM AND NONE DETECTED, RESPECTIVELY. TWO SUBSURFACE SOIL SAMPLES SBSB-2B (6-8) AND SBSB-2B (8-10) WERE COLLECTED BELOW THE WASTE IN THE NORTH SUBSURFACE DISPOSAL AREA. THESE SOILS HAD TOTAL PCBS CONCENTRATIONS OF 18 PPM AND 80 PPM, RESPECTIVELY. SBSB-2B (8-10) WAS THE ONLY SUBSURFACE SOIL SAMPLE TO EXCEED 50 PPM TOTAL PCBS.

NO VOCS WERE DETECTED IN THE HSL ANALYSIS OF SBSB-2B (8-10). SEVERAL SEMI-VOLATILE COMPOUNDS WERE DETECTED. THREE INORGANIC COMPOUNDS, COPPER, IRON AND VANADIUM EXCEEDED THE RANGE OF CONCENTRATIONS IN TABLE 5-31. CONCENTRATIONS OF COPPER, IRON AND VANADIUM ARE MUCH HIGHER IN THE SOILS THAN IN THE OVERLYING WASTE. THE WASTE IS NOT THE SOURCE OF THESE COMPOUNDS TO SUBSURFACE SOILS.

TWO SUBSURFACE SOIL SAMPLES WERE ALSO COLLECTED AT 0 TO 1.5 FEET AND 1.5 TO' 3 FEET BELOW LAND SURFACE OF WELL SBMW-2 LOCATED ABOUT 60 FEET EAST OF THE WASTE IN AREA B. THESE SAMPLES WERE ANALYZED FOR PCBS ONLY. TOTAL PCBS DETECTED IN THESE SAMPLES ARE 16 PPM AND 16.3 PPM, RESPECTIVELY. ANALYTICAL RESULTS ARE INCLUDED IN TABLE 5-47.

GROUND WATER SAMPLES WERE COLLECTED FROM WELLS SBMW-1, 2 AND 3 ON OCTOBER 10, 1988 AND JANUARY 18, 1989. FIRST ROUND SAMPLES WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. BECAUSE SEVERAL

SEMI-VOLATILE COMPOUNDS WERE DETECTED IN THE HSL ANALYSIS FOR SEMI-VOLATILE COMPOUNDS. WELL SBMW-2 WAS ALSO ANALYZED FOR ALL OF THE HSL PARAMETERS DURING THE FIRST SAMPLING COUNT. SAMPLES WERE COLLECTED FOR INORGANIC ANALYSIS. TABLE 5-49 SUMMARIZES ANALYTICAL RESULTS FOR DETECTED PARAMETERS.

PCBS WERE DETECTED IN WELL SBMW-2 IN JANUARY 1989 AT 0.0023 PPM AND 0.003 PPM (DUPLICATE SAMPLE). PCBS WERE NOT DETECTED IN ANY OTHER GROUND WATER SAMPLES FOR AREA B.

SEVERAL VOLATILE ORGANIC COMPOUNDS (1,1,1-TRICHLOROETHANE, AND TETRACHLOROETHENE) WERE DETECTED IN GROUND WATER IN AREA B. 1,1,1-TRICHLOROETHANE WAS DETECTED IN UPGRADIENT WELL SBMW-1 (0.008 PPM) DURING THE OCTOBER 1988 SAMPLING AND IS THE ONLY VOC DETECTED IN SBMW-1. 1,1,1-TRICHLOROETHANE, TETRACHLOROETHENE, TRICHLOROETHENE AND

1,2-DICHLOROETHENE WAS DETECTED IN SBMW-2.

TRICHLOROETHENE WAS DETECTED IN WELL SBMW-3 IN JANUARY 1989 AT 0.008 PPM. THIS COMPOUND WAS ALSO DETECTED IN THE ASSOCIATED ANALYTICAL BLANK. SAMPLE SBMW-3 WAS ANALYZED THE SAME DAY AS SAMPLES COLLECTED FROM WELLS IN AREA A. THE 0.008 PPM TRICHLOROETHENE DETECTED IN SBMW-3 IS SIMILAR TO THE 0.007 PPM TO 0.008 PPM DETECTED IN AREA A. TETRACHLOROETHENE WAS ALSO DETECTED IN WELL SBMW-3 IN JANUARY 1989 AT 0.025 PPM.

WELL SBMW-2, LOCATED IMMEDIATELY DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION IN AREA B, HAD THE HIGHEST CONCENTRATION OF VOCS, 33.886-PPM DETECTED IN OCTOBER 1988, AND 77.1 PPM (77.3 PPM IN A DUPLICATE SAMPLE) DETECTED IN JANUARY 1989.

DURING THE FIRST SAMPLING ROUND IN OCTOBER 1988, ALL THREE WELLS WERE ANALYZED FOR THE SEMI-VOLATILE COMPOUNDS. NO SEMI-VOLATILE COMPOUNDS WERE DETECTED IN ANY OF THE WELLS. THEREFORE, SEMI-VOLATILES WERE NOT INCLUDED IN THE LIST OF ANALYTICAL PARAMETERS FOR THE SECOND ROUND SAMPLES COLLECTED IN JANUARY 1989.

DURING THE FIRST SAMPLING ROUND IN OCTOBER 1988, SAMPLES WERE OBTAINED FROM DOWNGRADIENT WELL SBMW-3 FOR INORGANIC ANALYSIS. EIGHT COMPOUNDS WERE DETECTED IN THE NON-FILTERED SAMPLE. INORGANIC COMPOUND CONCENTRATIONS IN THE SAMPLE WAS LOW; THEREFORE, METALS WERE NOT INCLUDED IN THE ANALYTICAL PARAMETERS FOR THE SECOND ROUND GROUND WATER SAMPLES COLLECTED IN JANUARY 1989 EPA WAS NOTIFIED THAT INORGANIC, PESTICIDE, AND SEMI-VOLATILE COMPOUNDS WOULD NOT BE INCLUDED ON THE ANALYTICAL PARAMETER LIST FOR SECOND ROUND SAMPLES IN A LETTER DATED JANUARY 10, 1989.

AREA C

SOIL BORINGS AND EXPLORATORY TRENCHES WERE INSTALLED AS PART OF THE REMEDIAL INVESTIGATION TO CONFIRM ACTUAL WASTE PRESENCE AND DETERMINE

HORIZONTAL AND VERTICAL EXTENT OF THE AREAS OF WASTE DEPOSITION.

A TOTAL OF TWENTY SOIL BORINGS WERE DRILLED. SPLIT-SPOON REFUSAL WAS ENCOUNTERED ON TOP OF WASTE BETWEEN 1 AND 4 FEET BELOW LAND SURFACE IN BORINGS SCSB-1, 1A, 1B, 1C, 4, 4A AND 5. TO ASSIST IN SAMPLING BELOW THE WASTE, TRENCHES 2, 3 AND 4 WERE EXCAVATED TO REMOVE WASTE AT BORING LOCATIONS SCSB-4, 5 AND 6. BORINGS SCSB-4T, 5T AND 6T WERE ADVANCED THROUGH THE BOTTOM OF THE TRENCHES. WASTE WAS ALSO REMOVED AT SCSB-1 AND BORING SCSB-7T WAS DRILLED THROUGH THE BOTTOM OF THE EXCAVATION. EXPLORATORY TRENCHES INSTALLED IN THESE AREAS, AFTER THE SOIL BORINGS WERE DRILLED, REVEALED THE PRESENCE OF LARGE POWER FACTOR CAPACITORS IN THE AREA OF EACH OF THESE SOIL BORINGS EXCEPT SCSB-5. WASTE, IN THE FORM OF CAPACITOR DEBRIS (METAL, PAPER AND FOIL) WAS ENCOUNTERED BY BORINGS SCSB-1, SCSB-1E, 5A AND 6C. WASTE WAS NOT OBSERVED IN THE REMAINING TWELVE SOIL BORINGS.

FOLLOWING INSTALLATION OF THE SOIL BORINGS, FIFTEEN EXPLORATORY TRENCHES WERE INSTALLED TO FURTHER DETERMINE THE HORIZONTAL AND VERTICAL EXTENT OF THE TWO AREAS OF WASTE DEPOSITION. EXPLORATORY TRENCHES WERE EXCAVATED WITH A BACKHOE AND VISUALLY DESCRIBED BY THE ON-SITE RMT GEOLOGIST.

THE HORIZONTAL EXTENT OF THE TWO AREAS OF WASTE DEPOSITION WAS DETERMINED BY SOIL BORINGS AND EXPLORATORY TRENCHES. WASTE IN AREA C IS DISPOSED IN TWO PARALLEL TRENCHES ORIENTED IN A NORTHEAST DIRECTION. THE NORTHWEST TRENCH IS 120 FEET LONG AND 5 FEET WIDE. THE SOUTHEAST TRENCH IS 45 FEET LONG AND 12 FEET WIDE. LARGE POWER FACTOR CAPACITORS ARE PRESENT IN THE SOUTHEAST WASTE AREA. CAPACITOR PAPER, FOIL, METAL BANDING, AND POWER FACTOR CAPACITORS ARE PRESENT IN THE NORTHWEST WASTE DEPOSITION AREA. THE NORTHWEST WASTE AREA HAS AN APPROXIMATE SURFACE AREA OF 65 SQUARE YARDS AND THE SOUTHEAST AREA HAS AN APPROXIMATE SURFACE AREA OF 60 SQUARE YARDS. TOTAL WASTE VOLUME AT AREA C IS APPROXIMATELY 200 CUBIC YARDS.

A SAMPLE OF WASTE COLLECTED FROM SOIL BORING SCSB-6C AT 0.0 TO 2.0 FEET BELOW LAND SURFACE, AND A COMPOSITE SAMPLE OF WASTE COLLECTED FROM EXPLORATORY TRENCHES SCST-2, 3, AND 4, WERE ANALYZED FOR THE HSL PARAMETERS (SAMPLES OF WASTE FOR VOC ANALYSIS WERE COLLECTED FROM EXPLORATORY TRENCHES SCST-2, 3 AND 4 WERE ANALYZED SEPARATELY, (NOT COMPOSITED). ANALYTICAL RESULTS FOR WASTE ARE PRESENTED ON TABLE 5-50.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN THE WASTE. HOWEVER, THE CONCENTRATIONS OF VOCS DETECTED ARE NEAR THE DETECTION LIMITS. TRICHLOROETHENE WAS THE MOST COMMONLY FOUND CONSTITUENT.

NO SEMI-VOLATILE OR PESTICIDE COMPOUNDS WERE DETECTED IN THE WASTE IN AREA C.

PCBS WERE DETECTED IN BOTH WASTE SAMPLES SCSB-6C (0.0-2.0) AND SCST-2, 3, 4 AT 38,000 PPM AND 25,000 PPM TOTAL PCBS.

THE INORGANIC COMPOUND COPPER WAS THE ONLY COMPOUND DETECTED IN THE WASTE WITH CONCENTRATIONS ABOVE THE RANGE OF CONCENTRATIONS IN TABLE 5-31.

SEVENTEEN SURFACE SOIL SAMPLES (SCSS-1 THROUGH SCSS-17) WERE COLLECTED. SCSS-1 WAS ANALYZED FOR THE HSL PARAMETERS. SAMPLES SCSS-2 THROUGH SCSS-17 WERE ANALYZED FOR PCBS ONLY. TABLE 5-51 SUMMARIZES PARAMETERS DETECTED IN SCSS-1. PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-52. TOTAL PCB CONCENTRATIONS RANGED FROM NONE DETECTED AT SAMPLE SITE SCSS-4 TO 11,000 PPM DETECTED AT SCSS-7. ONLY SEVEN SAMPLES (SCSS-5, 7, 8, 9, 11, 12 AND 13) HAD PCB CONCENTRATIONS GREATER THAN 50 PPM. THESE SAMPLES WERE GROUPED TOGETHER AND LOCATED ALONG AND IMMEDIATELY DOWNGRADIENT AT THE NORTHWEST TRENCH.

IN ADDITION TO COMPOSITE WASTE SAMPLE SCST-2, 3 AND 4, AND WASTE SAMPLE SCSB-6C (0-2), TWENTY-THREE SUBSURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED. THREE SAMPLES, SCSB-5 (5-6.5) SCSB-5A (7.5-9) AND SCST-1 WERE ANALYZED FOR THE HSL PARAMETERS. THE REMAINING TWENTY SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS FOR PCBS ARE PRESENTED IN TABLE 5-53. ADDITIONAL PARAMETERS DETECTED IN THE HSL ANALYSES ARE PRESENTED IN TABLE 5-54.

PCBS WERE DETECTED IN ALL SUBSURFACE SOIL SAMPLES, EXCEPT SCSB-6A (4-6), COLLECTED ADJACENT TO THE NORTHWEST WASTE AREA. OF THE REMAINING SOIL SAMPLES, TWELVE HAD TOTAL PCB CONCENTRATIONS GREATER THAN 50 PPM. SAMPLES SCSB-1D (4-6), WITH A TOTAL PCB CONCENTRATION OF 214 PPM, WAS COLLECTED NEAR THE SOUTH END OF THE SOUTHEAST WASTE AREA. THE REMAINING TEN SAMPLES WITH GREATER THAN 50 PPM TOTAL PCBS WERE COLLECTED FROM BELOW THE WASTE, RANGING FROM 90 PPM AT SCSB-1E (8-9.5), SCSB-1E (10-11.5), SCSB-7T (7-8.5) AND SCSB-7T (9.5-11), WERE COLLECTED BELOW THE WASTE IN THE SOUTHWEST WASTE AREA. TOTAL PCB CONCENTRATIONS IN BOTH BORINGS DECREASED IN CONCENTRATION FROM 90 PPM TO 35 PPM IN SCSB-1E AND FROM 9,303 PPM TO 900 PPM AT BORING SCSB-7T. TOTAL PCBS DETECTED IN SOILS COLLECTED FROM BORING SCSB-6C INCREASED WITH DEPTH FROM 320 PPM TO 4,570 PPM. THE OTHER FOUR BORINGS DEMONSTRATED DECREASES IN TOTAL PCB CONCENTRATIONS IN DEPTH FROM 6,400 PPM TO 1.42 PPM AT SCSB-4T, 7,800 PPM TO 5.8 PPM AT SCSB-5T, 14, 100 PPM TO 3.9 PPM AT SCSB-5A AND 33,000 TO 24,000 AT SCSB-6T. AS SHOWN, THREE OF THESE BORINGS DECREASED IN PCB CONCENTRATIONS TO LESS THAN 50 PPM.

THE SUBSURFACE SOIL SAMPLES COLLECTED FROM BORINGS SCSB-2,3,6,6A AND 6B WERE COLLECTED OUTSIDE OF THE WASTE AREAS. TOTAL PCB CONCENTRATIONS IN THESE SAMPLES RANGED FROM NONE DETECTED TO 10 PPM. TWO SUBSURFACE SOIL SAMPLES WERE COLLECTED AT 0.5 TO 2 FEET BELOW LAND SURFACE AND 2 TO 3.5 FEET BELOW LAND SURFACE OF WELL SCMWB-5, AND ANALYZED FOR PCBS. TOTAL PCB CONCENTRATIONS FOR SCWMB-5 (0.5-2) WERE 1.60 PPM AND 1.13 PPM (DUPLICATE SAMPLE). SAMPLE SCMWB-5 (2-3.5) HAD A TOTAL PCB CONCENTRATION OF 0.93 PPM.

NO VOCS WERE DETECTED IN SAMPLES SCSB-5 (5-6.5) AND SCSB-5A (7.5-9) COLLECTED BELOW THE NORTHWEST WASTE AREA.

SEMI-VOLATILE ORGANIC COMPOUNDS AND PESTICIDE COMPOUNDS WERE NOT DETECTED IN ALL THREE SAMPLES. SEVERAL INORGANIC COMPOUNDS WERE DETECTED IN SAMPLES SCSB-5 (5-6.5), SCSB-5A (7.5-9) AND SCST-1. NONE OF THE CONCENTRATIONS DETECTED EXCEEDED THE RANGE OF CONCENTRATIONS IN TABLES 5-30 AND 5-31.

GROUND WATER SAMPLES WERE COLLECTED FROM WELL SCMW-5. THE SAMPLE WAS ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. TABLE 5-54 PRESENTS ANALYTICAL RESULTS FOR BOTH SAMPLING ROUNDS.

PCBS WERE DETECTED IN WELL SCMW-5 AT A CONCENTRATION OF 0.0075 PPM ON

OCTOBER 20, 1988 AND 0.0058 PPM ON JANUARY 17, 1989.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN GROUND WATER IN AREA C. TRICHLOROETHENE AND TETRACHLOROETHENE WERE THE MOST COMMON COMPOUNDS AND WERE DETECTED IN TEN WELLS.

TOTAL VOC CONCENTRATIONS IN THESE TEN WELLS FOR BOTH SAMPLING ROUNDS ARE INCLUDED ON TABLE 5-55. THE WELL (SCMW-5) HAD MUCH LOWER TOTAL VOC CONCENTRATIONS THAN OTHER AREA WELL WATER SAMPLES.

AREA D

SOIL BORINGS WERE INSTALLED AS PART OF THE REMEDIAL INVESTIGATION TO CONFIRM ACTUAL WASTE PRESENCE AND TO INVESTIGATE HORIZONTAL AND VERTICAL EXTENT OF THE AREA OF WASTE DEPOSITION. TWELVE TOTAL BORINGS WERE ATTEMPTED AT SEVEN LOCATIONS PROPOSED IN THE WORK PLAN. ALL OF THE BORINGS (EXCEPT SDSB-2,8 AND 10) ARE LOCATED IN AREAS OF SUSPECTED WASTE DEPOSITION. TWO BORINGS WERE INSTALLED IN THE AREA OF SDSB-4, AND THREE BORINGS WERE ATTEMPTED IN THE AREA OF BOTH SDSB-1 AND SDSB-5. BURIED DRUMS WERE ENCOUNTERED WHILE BORING IN THE AREA OF SDSB-1 AND SDSB-4. SUBSURFACE SOIL SAMPLING WAS TERMINATED TO AVOID THE RISK OF PUNCTURING DRUMS.

SOIL BORING LOCATIONS ARE SHOWN ON PLATE 3-8, AND LITHOLOGIC LOGS. WASTE, IN THE FORM OF SEMI-SOLID TO SOLID RESINOUS MATERIAL, WAS OBSERVED IN BORINGS SDSB-1B, 4, 4A, AND 7. WASTE WAS NOT OBSERVED IN THE EIGHT REMAINING SOIL BORINGS; HOWEVER, SPLIT-SPOON REFUSAL WAS ENCOUNTERED AT 0.5 FEET BELOW LAND SURFACE IN SDSB-1 AND A VOID WAS ENCOUNTERED AT 3.0 TO 4.5 FEET BELOW LAND SURFACE IN SDSB-1A, INDICATING THAT WASTE MAY BE PRESENT IN THESE AREAS.

SINCE THE SOIL BORING PROGRAM COULD NOT BE COMPLETED, THE VERTICAL EXTENT OF WASTE IS UNKNOWN, AND THE HORIZONTAL EXTENT OF THE WASTE HAS BEEN ESTIMATED BASED ON MAGNETIC ANOMALIES DETECTED IN THE PRELIMINARY INVESTIGATION. WASTE IN AREA D HAS AN APPROXIMATE SURFACE AREA OF 1,350

SQUARE YARDS. BASED ON A WASTE THICKNESS OF 10 FEET THERE COULD BE 4,500 CUBIC YARDS OF WASTE.

AFTER THE BORING PROGRAM WAS TERMINATED AN EXPLORATORY TRENCHING PROGRAM WAS INITIATED. SEVERAL DRUMS WERE UNCOVERED LESS THAN THREE FEET BELOW LAND SURFACE IN THE FIRST TRENCH. EXPLORATORY TRENCHING WAS THEN DISCONTINUED TO AVOID PUNCTURING THE DRUMS. A SAMPLE OF SOIL DESIGNATED SDSB-1 WAS TAKEN FROM THE EXCAVATION AND ANALYZED FOR THE HSL PARAMETERS. WASTE COLLECTED FROM SDSB-7 AT 2.0 TO 2.8 FEET BELOW LAND ANALYTICAL RESULTS FOR PARAMETERS DETECTED IN THE WASTE.

SEVERAL VOLATILE ORGANIC COMPOUNDS, WERE DETECTED IN WASTE FOUND IN AREA D. TRICHLOROETHENE AND TETRACHLOROETHENE WERE PREVALENT. NO SEMI-VOLATILE OR PESTICIDE COMPOUNDS WERE DETECTED IN THE WASTE.

TOTAL PCBS DETECTED IN SDSB-1 (SURFACE) WERE 77,800 PPM. THIS SOIL SAMPLE WAS COLLECTED IN AN AREA OF SPILLED LIQUID DURING ONE BACKHOE EXCAVATION.

ALUMINUM, ARSENIC, IRON, AND VANADIUM WERE THE ONLY INORGANIC COMPOUNDS FOUND IN THE WASTE AT CONCENTRATIONS ABOVE THE RANGE IN TABLE 5-31.

SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED FOR PCBS AND VOCS TO DETERMINE THE EXTENT OF THESE CONSTITUENTS ON THE LAND SURFACE. FORTY-FOUR SURFACE SOIL SAMPLES (SDSS-1 THROUGH SDSS-44) WERE COLLECTED. IN ADDITION TO PCBS AND VOCS, SAMPLE SDSS-1 WAS ANALYZED FOR THE HSL PARAMETERS. TABLE 5-58 SUMMARIZES PARAMETERS DETECTED IN SDSS-1. ANALYTICAL RESULTS FOR PCBS AND VOCS ARE SUMMARIZED ON TABLE 5-59. TOTAL PCB CONCENTRATIONS ARE ALSO SHOWN ON PLATE 3-13. TOTAL PCB CONCENTRATIONS RANGED FROM NONE DETECTED IN SAMPLE 5055-20 TO 1,010 PPM IN SAMPLE SDSS-11. ONLY TWELVE SAMPLES, (SDSS-2, 3, 4, 6, 7, 11, 18, 21, 22, 24, 29, AND 42) EXCEEDED 50 PPM TOTAL PCBS. THESE SAMPLES ARE GROUPED INTO TWO AREAS LOCATED AT THE EASTERN AND SOUTHERN PORTIONS OF AREA 0.

VOCS WERE DETECTED IN SEVEN SAMPLES (SDSS-4, 6, 7, 14, 17, 18 AND 29). TRICHLOROETHENE AND TETRACHLOROETHENE WERE THE MOST COMMON COMPOUNDS DETECTED. TOTAL VOC CONCENTRATIONS IN THESE SEVEN SAMPLES RANGE FROM 0.007 PPM TO 0.4 PPM. SURFACE SOIL SAMPLES SDSS-4, 6, 7, 14 AND 17 ARE GROUPED TOGETHER AT THE EAST END OF AREA D.

SUBSURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS BELOW LAND SURFACE AND BELOW THE WASTE. SUBSURFACE SOIL SAMPLING WAS TERMINATED AFTER DRUMS WERE DISCOVERED. TWELVE SOIL BORINGS WERE DRILLED. BORINGS SDSB-2, 5, 5A, 5B, 8 AND 10 DID NOT PENETRATE WASTE. ONE SOIL SAMPLE WAS COLLECTED FROM EACH BORING AND ANALYZED FOR PCBS. ANALYTICAL RESULTS ARE SUMMARIZED ON TABLE 5-60. PCB CONCENTRATIONS DETECTED WERE LOW, RANGING FROM 0.24 PPM TO 8.9 PPM. BORING SDSB-1A PENETRATED WASTE, AND SOIL SAMPLE SDSB-1A (5-6) WAS COLLECTED BELOW THE WASTE AND ANALYZED FOR HSL PARAMETERS. ANALYTICAL

RESULTS ARE PRESENTED IN TABLE 5-61. TOTAL PCBS DETECTED IN SDSB-1A (5-6) WAS 360 PPM.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED OF WHICH TRICHLOROETHENE WAS THE PRIMARY CONSTITUENT. BIS (2-ETHYLHEXYL) PHTHALATE WAS THE ONLY SEMI-VOLATILE COMPOUND DETECTED. PESTICIDE COMPOUNDS WERE NOT DETECTED. NONE OF THE INORGANIC COMPOUNDS EXCEEDED THE RANGE OF CONCENTRATIONS IN TABLES 5-30 AND 5-31.

IN ADDITION TO SOIL BORINGS IN THE VICINITY OF THE WASTE, TWO SOIL SAMPLES WERE COLLECTED AT EACH OF THE FOUR MONITORING WELL LOCATIONS (SDWB-1 THROUGH 4) AT 0 TO 1.5 FEET BELOW LAND SURFACE AND 1.5 TO 3 FEET BELOW LAND SURFACE. THESE SAMPLES WERE ANALYZED FOR PCBS. NO PCBS WERE DETECTED AT SDWB-2. SAMPLE SDWB-1 (0-1.5) HAD A CONCENTRATION OF 113 PPM JUST BELOW THE LAND SURFACE LAND SURFACE (0-1.5 FEET). HOWEVER, THE

SAMPLE DIRECTLY BELOW HAD A PCB CONCENTRATION OF 1.3 PPM. THE CONCENTRATION IN THE UNDERLYING SOIL SDWB-3 (1.5-3) WAS 0.290 PPM. TOTAL PCB CONCENTRATIONS AT SDWB-4 INCREASED WITH DEPTH FROM 2 PPM AT SDWB-4 (0-1.5) TO 23.9 PPM IN SDWB-4 (1.5-3).

GROUND WATER SAMPLES WERE COLLECTED FROM WELLS SDMW-1,2,3,4. THE TWO SAMPLING ROUNDS WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. TABLE 5-55 PRESENTS ANALYTICAL RESULTS FOR BOTH SAMPLING ROUNDS.

PCBS WERE NOT DETECTED IN THE AREA D WELLS.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN GROUND WATER IN AREA D. TRICHLOROETHENE AND TETRACHLOROETHENE WERE THE MOST COMMON COMPOUNDS AND WERE DETECTED IN TEN WELLS.

TOTAL VOC CONCENTRATIONS IN THESE TEN WELLS FOR BOTH SAMPLING ROUNDS ARE INCLUDED ON TABLE 5-55. THE HIGHEST CONCENTRATIONS OF VOCS WERE DETECTED IN AREA D RANGING FROM 0.356 PPM TO 90.8 PPM.

AREA E

SOIL BORINGS WERE INSTALLED AS PART OF THE REMEDIAL INVESTIGATION TO DETERMINE IF WASTE IS PRESENT IN AREA E. THREE SOIL BORINGS, SESB-1, 2 AND 3, WERE INSTALLED IN AREA E AT LOCATIONS SHOWN ON PLATE 3-6. TOTAL DEPTHS OF BORINGS WERE 16 FEET BELOW LAND SURFACE FOR SESB-1, 15 FEET BELOW LAND SURFACE FOR SESB-2, AND 12-FEET BELOW LAND SURFACE AT SESB-3. EACH OF THE BORINGS WERE TERMINATED AT LEAST FOUR FEET INTO SAPROLITE (AS DEFINED BY REMNANT ROCK STRUCTURE). NO WASTE WAS FOUND IN ANY OF THE BORINGS IN AREA E. CONSEQUENTLY, NO WASTE SAMPLES WERE COLLECTED.

SUBSURFACE SOILS WERE COLLECTED FROM THREE SOIL BORINGS IN AREA E TO DETERMINE IF PCBS ARE PRESENT. ONE SOIL SAMPLE FROM EACH BORING WAS COLLECTED AND ANALYZED FOR PCBS. ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-62. SAMPLE DEPTHS RANGED FROM 3.5 TO 7 FEET BELOW LAND SURFACE.

PCB CONCENTRATIONS WERE LOW, RANGING FROM 0.26 TO 14 PPM. AREA E IS PAVED, THEREFORE NO SURFACE SOIL SAMPLES WERE COLLECTED.

GROUND WATER SAMPLES WERE OBTAINED FROM WELL SEMW-1. FIRST ROUND SAMPLES WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. SAMPLES WERE COLLECTED FOR INORGANICS ANALYSIS. TABLE 5-63 SUMMARIZES ANALYTICAL RESULTS FOR DETECTED PARAMETERS. SECOND ROUND GROUND WATER SAMPLES WERE ANALYZED FOR VOCS, PCBS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATES.

PCBS WERE DETECTED IN WELLS SWMW-2,3,4,5,6,7 AND 7A IN BOTH SAMPLING ROUNDS WITH TOTAL PCB CONCENTRATIONS RANGING FROM 0.0032 PPM AT SWMW-3 (JANUARY 1989) TO 0.11 PPM IN WELL SWMW-5, ALSO IN JANUARY, 1989. PCBS WERE DETECTED IN WELL SWMW-8 AND 9 ONLY IN THE SECOND ROUND OF SAMPLES

WITH TOTAL PCB CONCENTRATIONS OF 0.014 PPM AND 0.038 PPM, RESPECTIVELY. PCBS WERE NOT DETECTED IN AREA E WELL SEMW-1 OR UPGRADIENT WELL SWMW-1 FOR THE WASTEWATER TREATMENT FACILITY.

SEVERAL VOLATILE ORGANIC COMPOUNDS (CHLOROFORM, 1,1-DICHLOROETHANE, 1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, TRICHLOROETHANE, AND TETRACHLOROETHANE) WERE DETECTED IN WELL SEMW-1 LOCATED IN AREA E, UPGRADIENT OF THE WASTEWATER TREATMENT FACILITY. TOTAL VOCS (EXCLUDING ACETONE) DETECTED IN SEMW-1 WERE 0.10 PPM (OCTOBER 1988) AND 0.107 PPM (JANUARY 1989).

IN THE WASTEWATER TREATMENT FACILITY WELLS, TOTAL 1,2-DICHLOROETHENE, TRICHLOROETHENE, AND TETRACHLOROETHENE WERE DETECTED IN WELLS SWMW-2 THROUGH SWMW-9 DURING BOTH SAMPLING EVENTS. IN ADDITION, TRICHLOROETHENE AND TETRACHLOROETHENE WERE DETECTED IN BACKGROUND WELL SWMW-1 DURING THE SECOND SAMPLING ROUND IN JANUARY 1989. THE TRICHLOROETHENE CONCENTRATION DETECTED IN SWMW-1 WAS 0.007 PPM.

IN ADDITION TO TOTAL 1,2-DICHLOROETHENE, TRICHLOROETHANE AND TETRACHLOROETHENE, SEVERAL OTHER VOCS (VINYL CHLORIDE, 1,1-DICHLOROETHENE, 1,1-DICHLOROETHANE, CHLOROFORM, 1,2-DICHLOROETHANE, CARBON TETRACHLORIDE AND BENZENE) WERE DETECTED AT LESS FREQUENT OCCURRENCES.

TOTAL VOC CONCENTRATIONS AND ARE INCLUDED IN TABLE 5-63. TOTAL VOC CONCENTRATIONS RANGED FROM NONE DETECTED DURING THE FIRST SAMPLING ROUND IN WELL SWMW-1 TO 3.306 PPM IN WELL SWMW-2 IN OCTOBER 1988.

TOTAL VOC CONCENTRATIONS IN WELL SWMW-9, LOCATED IMMEDIATELY UPGRADIENT OF THE INACTIVE LAGOON, AND WELLS SWMW-2 AND 3, LOCATED IMMEDIATELY DOWNGRADIENT OF THE INACTIVE LAGOON, RANGED FROM 0.608 PPM IN SWMW-3 TO 3.306 PPM IN SWMW-2. WELL SWMW-9 IS LOCATED APPROXIMATELY 45 FEET UPGRADIENT OF THE INACTIVE LAGOON. THE PRESENCE OF VOCS MAY BE THE RESULT OF DIRECT HYDROLOGIC CONNECTION (THROUGH FRACTURES) BETWEEN THE INACTIVE LAGOON AND THE SCREENED PORTION OF WELL SWMW-9. WELL SWMW-4,

LOCATED DOWNGRADIENT OF THE INACTIVE LAGOON AND IMMEDIATELY UPGRADIENT OF THE STABILIZATION LAGOON, HAD TOTAL VOC CONCENTRATIONS OF 1.101 PPM, 1.86 PPM AND 1.95 PPM (DUPLICATE SAMPLE). TOTAL VOCS IN WATER TABLE WELLS SWMW-5,6,7 AND 8 RANGED FROM 0.095 PPM IN SWMW-8 TO 2.15 PPM IN SWMW-5 AND SHOW DECREASES IN CONCENTRATION, WITH DISTANCE DOWNGRADIENT FROM THE STABILIZATION LAGOON; HOWEVER, WELL SWMW-7A, SCREENED BELOW THE WATER TABLE ON TOP OF BEDROCK, HAD HIGHER TOTAL VOC CONCENTRATIONS THAN ADJACENT WATER TABLE WELL SWMW-7. DETECTED CONCENTRATIONS IN SWMW-7A (1.96 PPM AND 2.57 PPM) WERE THE HIGHEST OF THE FIVE DOWNGRADIENT WELLS FOR THE RESPECTIVE SAMPLING PERIODS.

DURING THE FIRST ROUND SAMPLING IN OCTOBER 1988, WELLS SWMW 4 AND SWMW-6 WERE ANALYZED FOR SEMI-VOLATILE AND PESTICIDE ORGANIC COMPOUNDS. NO SEMI-VOLATILE COMPOUNDS WERE DETECTED. HEPTACHLOR EPOXIDE WAS THE ONLY PESTICIDE ORGANIC COMPOUND DETECTED IN SWMW-4 (0.00021 PPM) AND LOW

CONCENTRATIONS. SEMI-VOLATILE AND PESTICIDE ORGANICS COMPOUNDS WERE NOT INCLUDED IN- THE LIST OF ANALYTICAL PARAMETERS FOR SECOND ROUND SAMPLES COLLECTED IN JANUARY 1989.

IN OCTOBER 1988, SAMPLES WERE OBTAINED FROM DOWNGRADIENT WELL SWMW-4 AND 6 FOR INORGANIC COMPOUND ANALYSIS. TWELVE COMPOUNDS WERE DETECTED IN THE SAMPLE FOR WELL SWMW-4 (SEE TABLE 5-63). TEN INORGANIC COMPOUNDS WERE DETECTED IN THE SAMPLE FOR SWMW-6. CONCENTRATIONS IN BOTH THE SAMPLES WERE LOW, THEREFORE, METALS WERE NOT INCLUDED IN THE ANALYTICAL PARAMETERS FOR THE SECOND ROUND GROUND WATER SAMPLES COLLECTED IN JANUARY 1989.

EPA WAS NOTIFIED OF THE ELIMINATION OF INORGANIC, SEMI-VOLATILE, AND PESTICIDE ORGANIC COMPOUNDS FROM THE ANALYTICAL PARAMETER LIST FOR SECOND ROUND SAMPLES IN A LETTER DATED JANUARY 10, 1989.

AREA F

SOIL BORINGS AND EXPLORATORY TRENCHES WERE INSTALLED AS PART OF THE REMEDIAL INVESTIGATION TO DETERMINE IF WASTE WAS PRESENT, AND TO DETERMINE THE HORIZONTAL AND VERTICAL EXTENT OF WASTE.

A TOTAL OF SIX SOIL BORINGS WERE DRILLED IN AREA F.

SOIL BORING LOCATIONS ARE SHOWN ON PLATE 3-8. ALUMINUM HYDROXIDE SLUDGE WAS FOUND IN BORINGS SFSB-2 AND 2A. SLUDGE WAS ALSO FOUND IN THE AREA OFF BORING SFSB-3. NO WASTE WAS FOUND IN BORINGS SFSB-1, 1A AND 1B.

FOLLOWING THE INSTALLATION OF SOIL BORINGS, NINE EXPLORATORY TRENCHES WERE EXCAVATED TO FURTHER DETERMINE THE VERTICAL AND HORIZONTAL EXTENT OF SLUDGE IN THE VICINITY OF SFSB-2. TRENCH LOCATIONS ARE SHOWN ON PLATE 3-9. TRENCHES WERE EXCAVATED WITH A BACKHOE WITH DEPTHS RANGING FROM 1.5 TO 9 FEET BELOW LAND SURFACE. THE SLUDGE IS DEPOSITED IN AN ELONGATED AREA APPROXIMATELY 23 FEET WIDE AND 75 FEET LONG COMPRISING AN AREA OF ABOUT 180 SQUARE YARDS. CROSS SECTIONS OF THE AREA OF WASTE

DEPOSITION ARE SHOWN ON PLATE 3-9. SLUDGE DEPOSITED IN THE VICINITY OF SFSB-2 IS MOSTLY COVERED WITH SOIL FILL. DEPTH TO THE SLUDGE RANGES FROM LAND SURFACE TO S FEET BELOW LAND SURFACE. SLUDGE THICKNESS RANGED FROM 0.2 TO 5 FEET. THE ESTIMATED VOLUME OF WASTE IN AREA F IS 200 CUBIC YARDS.

A SAMPLE OF SLUDGE COLLECTED FROM SOIL BORINGS SFSB-2A AT 4 TO 6 FEET BELOW LAND SURFACE DESIGNATED SFSB-2A (4-6) WAS ANALYZED FOR THE HSL PARAMETERS. ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-64. TRICHLOROETHENE AND TETRACHLOROETHENE WERE THE ONLY VOLATILE ORGANIC COMPOUNDS DETECTED AND HAD CONCENTRATIONS LESS THAN 1 PPM. SEMI-VOLATILE AND PESTICIDE COMPOUNDS WERE NOT DETECTED. PCBS WERE DETECTED IN THE WASTE WITH A TOTAL PCB CONCENTRATION OF 20,900 PPM. A SAMPLE OF WASTE WAS ALSO COLLECTED 4 TO 6 FEET BELOW LAND SURFACE FROM A BORE HOLE ADJACENT TO SFSB-2A DESIGNATED SFSB-2W (4-6) AND ANALYZED FOR

PCBS. AROCLORS 1248 AND 1254 WERE DETECTED WITH A TOTAL PCB CONCENTRATION OF 16,500 PPM.

ALUMINUM WAS THE ONLY INORGANIC COMPOUND DETECTED AT CONCENTRATIONS ABOVE THE RANGE IN TABLE 5-31.

SUBSURFACE SOILS WERE ANALYZED TO DETERMINE THE PRESENCE OF PCBS AND OTHER CONSTITUENTS BELOW LAND SURFACE AND BELOW THE WASTE. SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE.

ELEVEN SURFACE SOIL SAMPLES (SFSS-1 THROUGH 11) WERE COLLECTED. SFSS-1 WAS ANALYZED FOR THE HSL PARAMETERS. TABLE 5-65 SUMMARIZES PARAMETERS DETECTED IN SFSS-1. SAMPLES SFSS-2 THROUGH 11 WERE ANALYZED FOR PCBS ONLY. PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-66. TOTAL PCB CONCENTRATIONS RANGED FROM NONE DETECTED IN SOIL SAMPLES SFSS-2 TO 632 PPM DETECTED IN SFSS-5. ONLY FOUR SAMPLES, SFSS-4, S, 6 AND 9, EXCEEDED 50 PPM.

IN ADDITION TO WASTE SAMPLES SFSB-2A (4-6) AND SFSB-2W (4-6), NINE SUBSURFACE SOIL SAMPLES WERE COLLECTED FOR ANALYSIS. ONE SAMPLE, SFSB-2 (9.5-11.5) COLLECTED BELOW THE WASTE, WAS ANALYZED FOR THE HSL PARAMETERS. THE REMAINING SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS FOR PCBS ARE PRESENTED IN TABLE 5-67. THE ADDITIONAL PARAMETERS DETECTED IN THE HSL ANALYSIS OF SAMPLE SFSB-2 (9.5-11.5) ARE PRESENTED IN TABLE 5-68. NONE OF THE SUBSURFACE SOIL SAMPLES HAD TOTAL PCB CONCENTRATIONS GREATER THAN 50 PPM. BORINGS SFSB-1, 1A AND 1B WERE DRILLED IN AN AREA OF SUSPECTED WASTE DEPOSITION. NO WASTE WAS OBSERVED IN THESE BOREHOLES. A SOIL SAMPLE WAS COLLECTED AT 4 TO 6 FEET BELOW LAND SURFACE IN EACH BORING AND ANALYZED FOR PCBS. TOTAL PCB CONCENTRATIONS IN THESE SAMPLES WERE 0.077 PPM, 1.45 PPM AND NONE DETECTED, RESPECTIVELY. BORINGS SFSB-2 AND 2A WERE DRILLED THROUGH THE AREA OF WASTE DEPOSITION. SAMPLES SFSB-2 (8-9.5), SFSB-2 (9.5-11.5) AND SFSB-2A (6-8), WERE COLLECTED BENEATH THE WASTE. TOTAL PCB CONCENTRATIONS TO 3.5 FEET BELOW THE WASTE, TO 0.3 PPM IN SAMPLE SFSS-2

(9.5-11.5), COLLECTED 3.5 TO 5.5 FEET BELOW THE WASTE. TOTAL PCB CONCENTRATIONS IN BORING SFSB-2A DECREASED FROM 20,900 PPM DETECTED IN THE WASTE TO 24.1 PPM DETECTED IN THE UNDERLYING SOIL SAMPLE.

SAMPLE SFSB-3 (3.5-5) WAS COLLECTED IN AN AREA WHERE NON-PCB BEARING WASTE SLUDGE WAS DISPOSED. NO PCBS WERE DETECTED IN THIS SAMPLE. SAMPLES SFWB-6 (0-1.5) AND SFWB(1.5-3) WERE COLLECTED AT THE BORING LOCATION FOR WELL SFMW-6. NO PCBS WERE DETECTED IN THESE SAMPLES.

IN ADDITION TO PCBS, SUBSURFACE SOIL SAMPLE SFSB-2 (9.5-11.5) WAS ANALYZED FOR THE HSL PARAMETERS. ANALYTICAL RESULTS FOR DETECTED PARAMETERS ARE INCLUDED IN TABLE 5-68. ONE SEMI-VOLATILE COMPOUND, BIS (2-ETHYLHEXYL) PHTHALATE, WAS DETECTED AT 1.5 PPM. PESTICIDES WERE NOT DETECTED. NONE OF THE INORGANIC COMPOUNDS EXCEEDED THE RANGE OF CONCENTRATIONS IN TABLES 5-30 AND 5-31.

GROUND WATER SAMPLES WERE COLLECTED FROM WELL SFMW-6. BOTH SAMPLING ROUNDS WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. TABLE 5-55 PRESENTS ANALYTICAL RESULTS FOR BOTH SAMPLING ROUNDS.

PCBS WERE NOT DETECTED IN THE AREA F WELL.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN GROUND WATER IN AREA F. TRICHLOROETHENE AND TETRACHLOROETHENE WERE THE MOST COMMON COMPOUNDS AND WERE DETECTED IN TEN WELLS.

TOTAL VOC CONCENTRATIONS IN THESE TEN WELLS FOR BOTH SAMPLING ROUNDS ARE INCLUDED ON TABLE 5-55 AND SHOWN ON PLATE 3-15. THE WELL HAD MUCH LOWER TOTAL VOC CONCENTRATIONS THAN THE OTHER AREA WELL SAMPLES.

AREA G

PRELIMINARY CONSTITUENT SOURCE INVESTIGATIONS WERE PERFORMED AND SUSPECTED AREAS OF WASTE DEPOSITION WERE IDENTIFIED. TWENTY-SEVEN SOIL BORINGS WERE DRILLED TO DETERMINE THE VERTICAL AND HORIZONTAL EXTENT OF WASTE, IF PRESENT. NONE OF THE BORINGS PENETRATED WASTE. SOIL BORING LOCATIONS ARE SHOWN ON PLATE 3-8. SOIL BORING DEPTHS RANGED FROM FIVE TO SIX FEET BELOW LAND SURFACE. THERE WERE NO VISIBLE WASTE PRESENT IN ANY OF THE SOIL BORINGS. THREE TRENCHES, SGST-1, 2 AND 3, WERE EXCAVATED WITH A BACKHOE TO VERIFY THAT WASTE IS NOT PRESENT IN AREA G. TRENCHES SGST-1 AND 2 ARE 70 AND 59 FEET LONG, RESPECTIVELY, AND TRANSECT AREA G ACROSS SUSPECTED AREAS OF WASTE DEPOSITION IDENTIFIED IN THE RI WORK PLAN. TRENCH SGST-3 WAS EXCAVATED ACROSS A BERM LOCATED AT THE EAST END OF AREA G. NO VISIBLE SIGNS OF WASTE WERE OBSERVED IN THE TRENCHES.

SUBSURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE IF PCBS ARE PRESENT BELOW LAND SURFACE. SURFACE SOIL SAMPLES WERE COLLECTED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE.

TWENTY-NINE SURFACE SOIL SAMPLES (SGSS-1 THROUGH 29) WERE COLLECTED AT LOCATIONS SHOWN ON PLATE 3-13. SGSS-1 WAS ANALYZED FOR THE HSL PARAMETERS. PARAMETERS DETECTED IN SGSS-1 ARE SUMMARIZED IN TABLE 5-69. SAMPLES SGSS-2 THROUGH 29 WERE ANALYZED FOR PCBS ONLY. PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-70 AND PRESENTED ON PLATE 3-13. TOTAL PCB CONCENTRATIONS RANGED FROM NONE DETECTED, IN SAMPLES SGSS-5, 7, 16, 17, 18, TO 3,800 PPM, DETECTED IN SGSS-25. ONLY FOUR SAMPLES, SGSS-15 (50.4 PPM), SGSS-25 (3800 PPM), SGSS-26 (1500 PPM) AND SGSS-29 (99 PPM), EXCEED 50 PPM. SAMPLE SGSS-25 WAS COLLECTED FROM AN EARTHEN BERM THAT EXTENDS EASTWARD FROM AREA G INTO AREA H. THIS BERM APPEARS TO HAVE BEEN FORMED AS A RESULT OF REMOVING SOIL FROM A CLEARED AREA IN AREA H AND THE SOUTHEAST CORNER OF AREA G. SAMPLE SGSS-26 IS LOCATED IN THIS CLEARED AREA. (TEN SURFACE SOILS COLLECTED FROM THE CLEARED AREA IN AREA H ALSO EXCEED 50 PPM TOTAL PCBS.) SURFACE SOIL

SAMPLES SGSS-15 AND SGSS-29 ARE LOCATED IN SEPARATE AREAS, AND ARE LOCATED IN THE VICINITY OF SAMPLES WITH MUCH LOWER CONCENTRATIONS.

TWENTY-FOUR SUBSURFACE SOIL SAMPLES WERE COLLECTED TO DETERMINE THE PRESENCE OF PCBS AND OTHER CONSTITUENTS IN SUBSURFACE SOILS. TWO SAMPLES, SGSB-5 (4-6) AND TRENCH 3 (2.5-4), WERE ANALYZED FOR THE HSL PARAMETERS. THE REMAINING SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS FOR PCBS ARE PRESENTED IN TABLE 5-71. ADDITIONAL PARAMETERS DETECTED IN THE HSL ANALYSIS ARE SUMMARIZED IN TABLE 5-72.

PCBS WERE DETECTED IN ONLY SEVEN OF THE TWENTY-FOUR SAMPLES COLLECTED. SAMPLES SGSB-11 (4-6), SGSB-11A (4-6) AND TRENCH 3 (2.5-6) HAD TOTAL PCB CONCENTRATIONS OF 74 PPM, 7,000 PPM AND 8,000 PPM AND ARE THE ONLY SAMPLES THAT EXCEEDED 50 PPM TOTAL PCBS. THESE THREE SAMPLES WERE COLLECTED FROM THE BERM.

TABLE 5-73 SUMMARIZES ANALYTICAL RESULTS FOR PARAMETERS OTHER THAN PCBS DETECTED IN THE HSL ANALYSIS OF SAMPLES TRENCH-3 (2.5-4) AND SGSB-5 (4-6). SEMI-VOLATILE AND PESTICIDE ORGANIC COMPOUNDS TRICHLOROETHENE AND TETRACHLOROETHENE WERE DETECTED IN SAMPLE TRENCH-3 (2.5-4). THESE COMPOUNDS WERE ALSO DETECTED IN THE ASSOCIATED ANALYTICAL BLANK SAMPLES.

THE INORGANIC COMPOUND COPPER EXCEEDED THE RANGE OF CONCENTRATIONS ON TABLES 5-30 AND 5-31. SILVER WAS ONLY 0.1 PPM ABOVE THE RANGE OF CONCENTRATIONS ON TABLE 5-30. THE SILVER CONCENTRATIONS MAY REFLECT NATURALLY OCCURRING CONCENTRATIONS.

TWO ADDITIONAL SUBSURFACE SOIL SAMPLES WERE COLLECTED AT 0 TO 1.5 FEE BELOW LAND SURFACE AND 1.5 TO 3 FEET BELOW LAND SURFACE AT WELL BORINGS FOR WELLS SGMW-7, 8 AND 9. THESE SAMPLES WERE ANALYZED FOR PCBS ONLY. ONE SAMPLE, SGMW-7 (0-1.5), HAD A TOTAL PCB CONCENTRATION OF 0.037 PPM, AND IS THE ONLY WELL BORING SAMPLE IN WHICH PCBS WERE DETECTED.

GROUND WATER SAMPLES WERE COLLECTED FROM WELLS SGMW-7, 8, 9. BOTH SAMPLING ROUNDS WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE,

SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. TABLE 5-55 PRESENTS ANALYTICAL RESULTS FOR BOTH SAMPLING ROUNDS.

PCBS WERE NOT DETECTED IN THE AREA G WELLS.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN GROUND WATER IN AREA G. TRICHLOROETHENE AND TETRACHLOROETHENE WERE THE MOST COMMON COMPOUNDS AND WERE DETECTED IN TEN WELLS.

TOTAL VOC CONCENTRATIONS IN THESE TEN WELLS FOR BOTH SAMPLING ROUNDS ARE INCLUDED ON TABLE 5-55. THE REMAINING WELLS (SGMW-7,8 AND 9) HAD MUCH LOWER TOTAL VOC CONCENTRATIONS THAN THE OTHER AREAS WELLS.

AREA H

PRELIMINARY CONSTITUENT SOURCE INVESTIGATIONS WERE PERFORMED AND SUSPECTED AREAS OF WASTE DEPOSITION WERE IDENTIFIED. THIRTEEN SOIL BORINGS WERE DRILLED IN AREA H TO LOCATE WASTE. SOIL BORING DEPTHS RANGED FROM FOUR TO SIX FEET BELOW LAND SURFACE. NO VISIBLE WASTES WERE FOUND IN ANY OF THE SOIL BORINGS. TWENTY-ONE EXPLORATORY TRENCHES WERE EXCAVATED WITH A BACKHOE TO DETERMINE THE PRESENCE OF WASTE IN AREA H. TRENCH LENGTHS RANGED FROM 4 TO 80 FEET AND TRANSECT ACROSS MAGNETIC AND TOPOGRAPHIC ANOMALIES ON THE LAND SURFACE. WASTE WAS FOUND IN ONLY ONE TRENCH, SHST-6. LESS THAN ONE CUBIC YARD OF WASTE IN THE FORM OF CAPACITOR DEBRIS WAS PRESENT.

A SAMPLE OF WASTE WAS COLLECTED FROM TRENCH SHST-6 AND ANALYZED FOR HSL PARAMETERS. ANALYTICAL RESULTS ARE SHOWN ON TABLE 5-73. ONLY ONE VOLATILE ORGANIC COMPOUND, TOTAL XYLENE, AND ONLY ONE SEMI-VOLATILE COMPOUND, BIS (2-ETHYLHEXYL) PHTHALATE WERE DETECTED. PESTICIDE COMPOUNDS WERE NOT DETECTED. A TOTAL PCB CONCENTRATION OF 2.16 PPM WAS DETECTED IN THE WASTE. SIX INORGANIC COMPOUNDS, ALUMINUM, ARSENIC, CADMIUM, COPPER, SILVER, AND ZINC WERE ABOVE THE RANGE OF CONCENTRATIONS IN TABLE 5-30. THE ZINC CONCENTRATION WAS WITHIN THE RANGE OF CONCENTRATIONS IN TABLE 5-31.

SURFACE SOIL SAMPLES WERE COLLECTED AND ANALYZED TO DETERMINE THE EXTENT OF PCBS ON THE LAND SURFACE. SUBSURFACE SOILS WERE ANALYZED TO DETERMINE IF PCBS ARE PRESENT BELOW LAND SURFACE. TWENTY-EIGHT SURFACE SOIL SAMPLES (SHSS-1 THROUGH 28) WERE COLLECTED. SHSS-1 WAS ANALYZED FOR HSL PARAMETERS. TABLE 5-74 SUMMARIZES PARAMETERS DETECTED. SAMPLES SHSS-2 THROUGH SHSS-28 WERE ANALYZED FOR PCBS ONLY. PCB CONCENTRATIONS ARE SUMMARIZED IN TABLE 5-75. PCBS WERE DETECTED IN TWENTY-EIGHT SAMPLES. TOTAL PCB CONCENTRATIONS RANGED FROM 0.28 PPM AT SHSS-22 TO 8,700 PPM AT SHSS-12. TEN SAMPLES HAD TOTAL PCB CONCENTRATIONS EXCEEDING 50 PPM. ALL TEN SAMPLES WERE COLLECTED FROM A CLEARED AREA FROM WHICH TOPSOIL HAD APPARENTLY BEEN REMOVED IN THE CENTER OF AREA H AND USED TO FORM A BERM ALONG THE NORTHWEST EDGE OF THE CLEARED AREA. PCB CONCENTRATIONS IN SOILS COLLECTED NORTH AND SOUTH OF THE CLEARED AREA HAD MUCH LOWER PCB CONCENTRATIONS.

EIGHT SUBSURFACE SOIL SAMPLES WERE COLLECTED TO DETERMINE IF PCBS AND OTHER CONSTITUENTS ARE PRESENT IN SUBSURFACE SOILS. SAMPLE SHSB-5 (4-5) WAS ANALYZED FOR THE HSL PARAMETERS. THE REMAINING SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS FOR PCBS ARE PRESENTED IN TABLE 5-76. ADDITIONAL PARAMETERS DETECTED IN THE HSL ANALYSIS OF SHSB-5 (4-5) ARE PRESENTED IN TABLE 5-77. ONLY TWO SAMPLES HAD PCBS DETECTED. SAMPLE SHSB-4 (6-8), COLLECTED IN AN EARTHEN BERM LOCATED NORTH OF THE CLEARED AREA, HAD A TOTAL PCB CONCENTRATION OF 4.4 PPM. SAMPLE SHSB-2 (4-5.5) COLLECTED IN THE CLEARED AREA HAD A CONCENTRATION OF 190 PPM. THIS WAS THE ONLY SAMPLE TO EXCEED 50 PPM TOTAL PCBS.

THERE WERE NO SEMI-VOLATILE ORGANIC, PESTICIDE ORGANIC OR PCB COMPOUNDS DETECTED IN THE HSL ANALYSIS OF SAMPLE SHSB-5B (4-5). SILVER WAS THE ONLY INORGANIC COMPOUND TO EXCEED THE RANGE OF CONCENTRATIONS IN TABLE

5-30.

GROUND WATER SAMPLES WERE COLLECTED FROM WELL SHMW-10. BOTH SAMPLING ROUNDS WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. TABLE 5-55 PRESENTS ANALYTICAL RESULTS FOR BOTH SAMPLING ROUNDS.

PCBS WERE NOT DETECTED IN THE AREA H WELLS.

SEVERAL VOLATILE ORGANIC COMPOUNDS WERE DETECTED IN GROUND WATER IN AREA H. TRICHLOROETHENE AND TETRACHLOROETHENE WERE THE MOST COMMON COMPOUNDS AND WERE DETECTED IN TEN WELLS.

TOTAL VOC CONCENTRATIONS IN THESE TEN WELLS FOR BOTH SAMPLING ROUNDS ARE INCLUDED ON TABLE 5-55. WELL SHMW-10, LOCATED SOUTH AND DOWNGRADIENT OF AREA H, HAD THE HIGHEST CONCENTRATIONS DETECTED ON TOP OF THE RIDGE OUTSIDE OF AREA D.

SEPTIC DRAIN FIELD

THERE ARE THREE SEPTIC TANK DRAIN FIELDS ON THE SANGAMO WESTON PROPERTY. TWO FIELDS ARE LOCATED ADJACENT TO EACH OTHER NORTH OF THE MANUFACTURING FACILITY. THESE DRAIN FIELDS ARE ADDRESSED COLLECTIVELY AS THE NORTH DRAIN FIELD. THE THIRD DRAIN FIELD IS LOCATED SOUTH OF THE MANUFACTURING BUILDING AND IS REFERRED TO AS THE SOUTH DRAIN FIELD. THESE DRAIN FIELDS WERE USED FOR DEPOSITION OF SANITARY WASTEWATERS FROM THE PLANT.

SUBSURFACE SOILS WERE ANALYZED TO DETERMINE THE PRESENCE OF PCBS AND OTHER CONSTITUENTS BELOW THE SEPTIC DRAIN FIELDS. BORINGS WERE EXTENDED TO TWENTY FEET BELOW LAND SURFACE OR AUGER REFUSAL, WHICHEVER WAS SHALLOWER. SOIL SAMPLES WERE RETAINED AT ABOUT FIVE FEET BELOW LAND SURFACE, TEN FEET BELOW LAND SURFACE, AND THE BOTTOM OF THE BOREHOLE. BORINGS SSSB-2 AND SSSB-2B ENCOUNTERED SHALLOW AUGER REFUSAL; THEREFORE, THESE BOREHOLES WERE SAMPLED AT 4 TO 5 FEET AND 3.5 TO 4 FEET BELOW LAND

SURFACE, RESPECTIVELY.

SOIL BORINGS SSSB-1, 2, 2B, 3C AND 4B ARE LOCATED IN THE SOUTH DRAIN FIELD. BORINGS SSSB-5, 6C,7,9 AND 9B ARE LOCATED IN THE NORTH DRAIN FIELD. A TOTAL OF TWENTY-FIVE SUBSURFACE SOIL SAMPLES WERE COLLECTED. SAMPLES SSSB-4B (18-20) AND SSSB-7 (17-20) WERE ANALYZED THE HSL PARAMETERS. THE REMAINING SAMPLES WERE ANALYZED FOR PCBS ONLY. TABLE 5-78 SUMMARIZES PCB CONCENTRATIONS DETECTED. HSL PARAMETERS DETECTED IN SSSB-4B (18-20) AND SSSB-7 (17-20) ARE PRESENTED IN TABLE 5-79.

PCBS WERE DETECTED IN EIGHT OF THE TEN SAMPLES COLLECTED IN THE SOUTH DRAIN FIELD. WITH THE EXCEPTION OF BORING SSSB-2B, PCBS WERE DETECTED IN THE BOTTOM SAMPLE OF EACH BORING (8 TO 20 FEET BELOW LAND SURFACE). SAMPLE SSSB-4B (18-20) COLLECTED AT 18 TO 20 FEET BELOW LAND SURFACE HAD A PCB CONCENTRATION OF 10 PPM (AROCLOR 1016). THIS WAS THE HIGHEST

CONCENTRATION DETECTED. THE REMAINING SAMPLES HAD PCB CONCENTRATIONS LESS THAN 1 PPM.

NO PCBS WERE DETECTED IN THE THREE SAMPLES COLLECTED IN BORING SSSB-5 LOCATED IN THE NORTH DRAIN FIELD. SAMPLE SSSB-7 (17-20) WAS THE ONLY SAMPLE IN BORING SSSB-7 THAT HAD PCBS DETECTED. PCBS WERE ALSO DETECTED IN THE ASSOCIATED METHOD BLANK SAMPLE (PREPARED BY THE LABORATORY) AT 0.25 PPM, THUS THIS CONCENTRATION MAY NOT BE REPRESENTATIVE OF THE SAMPLE. PCBS WERE DETECTED IN ONLY ONE SAMPLE IN BORING SSSB-8, AT A DEPTH OF 5-6 FEET. THIS WAS THE SHALLOWEST SAMPLE COLLECTED. PCBS WERE DETECTED IN ALL THREE SAMPLES IN BORING SSSB-9B. PCB CONCENTRATIONS IN THE NORTH DRAIN FIELD WERE ALL WELL BELOW 1 PPM, RANGING FROM NONE DETECTED TO 0.377 PPM.

IN ADDITION TO PCBS, SAMPLE SSSB-4B (18-20), COLLECTED FROM THE SOUTH DRAIN FIELD.AND SAMPLE SSSB-7 (17-20), COLLECTED FROM THE NORTH DRAIN FIELD, WERE ANALYZED FOR THE HSL PARAMETERS. THE SEMI-VOLATILE COMPOUND DI-N-BUTYL PHTHALATE WAS DETECTED IN BOTH SAMPLES, AND BIS (ETHYLHEXYL) PHTHALATE WAS DETECTED IN SSSB-4B (18-20). NO PESTICIDE COMPOUNDS WERE DETECTED. THE INORGANIC COMPOUNDS WERE ALL WITHIN THE RANGE OF CONCENTRATIONS IN TABLES 5-30 AND 5-31.

WASTEWATER TREATMENT FACILITY

THE WASTEWATER TREATMENT FACILITY CONSISTED OF A PRIMARY SETTLING BASIN AND A LARGE STABILIZATION LAGOON. THE TREATMENT SYSTEM WAS PRIMARILY DESIGNED FOR NEUTRALIZATION OF ACID SOLUTIONS USED IN THE ETCHING AND FORMING PROCESS AND FOR THE PRECIPITATION OF DISSOLVED MATERIALS SUCH AS ALUMINUM. THE ALUMINUM PRECIPITATES SETTLED IN THE PRIMARY SETTLING BASIN. THE FACILITY WAS MODIFIED BY REPLACING THE PRIMARY BASIN (NOW REFERRED TO AS THE INACTIVE LAGOON) WITH A CONCRETE LINED EQUALIZATION BASIN. THE INACTIVE LAGOON IS NO LONGER USED FOR WASTEWATER TREATMENT. THE STABILIZATION BASIN IS STILL IN USE.

SIX SOIL BORINGS (SWSB-1 THROUGH 6) WERE INSTALLED IN THE INACTIVE

LAGOON TO DETERMINE THE VERTICAL EXTENT OF SLUDGE. BORINGS WERE DRILLED USING HOLLOW STEM AUGERS WITH SPLIT SPOON SOIL SAMPLES COLLECTED CONTINUOUSLY. TOTAL DEPTH TO THE BOTTOM OF THE SLUDGE RANGED FROM ELEVEN FEET BELOW LAND SURFACE AT BORING SWSB-1 TO THIRTEEN FEET BELOW LAND SURFACE AT BORING SWSB-5. THE SURFACE AREA OF THE WASTE IS ABOUT 1,380 SQUARE YARDS. THE ESTIMATED TOTAL VOLUME OF SLUDGE IN THE INACTIVE LAGOON IS 4,400 CUBIC YARDS.

SLUDGE FROM EACH BORING WAS COMPOSITED INTO ONE SAMPLE AND ANALYZED FOR PCBS. ADDITIONALLY, SLUDGE FROM BORING SWSB-2 WAS ANALYZED FOR THE HSL PARAMETERS. ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-80. THE COMPOSITE SLUDGE SAMPLE HAD A TOTAL PCB CONCENTRATION OF 23,200 PPM AND 26,400 PPM (DUPLICATE SAMPLE). SAMPLE SWSB-2 (2-6) HAD A TOTAL PCB CONCENTRATION OF 187 PPM.

THE VOLATILE ORGANIC COMPOUND TETRACHLOROETHENE WAS DETECTED IN THE WASTE. NO SEMI-VOLATILE OR PESTICIDE COMPOUNDS WERE DETECTED. ALL OF THE INORGANIC COMPOUNDS EXCEPT ALUMINUM AND ARSENIC WERE WELL WITHIN THE RANGE OF CONCENTRATIONS IN TABLES 5-30 AND 5-31.

SUBSURFACE SOIL SAMPLES WERE COLLECTED FROM BELOW THE ALUMINUM HYDROXIDE SLUDGE IN THE INACTIVE LAGOON. NINE SUBSURFACE SOIL SAMPLES WERE COLLECTED. SAMPLE SWSB-5A (17-19) WAS ANALYZED FOR THE HSL PARAMETERS. THE REMAINING SAMPLES WERE ANALYZED FOR PCBS ONLY. ANALYTICAL RESULTS FOR PCBS ARE PRESENTED IN TABLE 5-81. HSL PARAMETERS DETECTED IN SWSB-5A (17-19) ARE PRESENTED IN TABLE 5-82. PCBS WERE DETECTED IN ALL NINE SAMPLES, RANGING FROM 23.2 PPM IN SWSB-1 (14-16) TO 34,300 PPM DETECTED IN SWSB-6 (11.5-12). FIVE OF THESE SAMPLES EXCEEDED 50 PPM TOTAL PCBS.

IN ADDITION TO PCBS, SAMPLE SWSB-5A (17-19) WAS ANALYZED FOR THE HSL PARAMETERS. TOTAL XYLENE WAS DETECTED AT 0.06 PPM IN A DILUTED SAMPLE. NO VOCS WERE DETECTED IN THE UNDILUTED SAMPLE. NO SEMI-VOLATILE OR PESTICIDE COMPOUNDS WERE DETECTED. ALL OF THE INORGANIC COMPOUNDS DETECTED WERE WITHIN THE RANGE OF CONCENTRATIONS IN TABLES 5-30 AND 5-31.

EPA SAMPLED SEDIMENTS IN THE STABILIZATION LAGOON ON MAY 10, 1989. RESULTS OF THAT INVESTIGATION ARE SUMMARIZED IN TABLE 5-83.

GROUND WATER SAMPLES WERE OBTAINED FROM WELL SWMW-1. FIRST ROUND SAMPLES WERE ANALYZED FOR PCBS, VOCS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATE. WELLS SWMW-4 AND 6 WERE ALSO ANALYZED FOR ALL OF THE HSL PARAMETERS. BOTH FILTERED AND NONFILTERED SAMPLES WERE COLLECTED FOR INORGANICS ANALYSIS. TABLE 5-63 SUMMARIZES ANALYTICAL RESULTS FOR DETECTED PARAMETERS. SECOND ROUND GROUND WATER SAMPLES WERE ANALYZED FOR VOCS, PCBS, PH, SPECIFIC CONDUCTANCE, SUSPENDED SOLIDS, ALKALINITY, HARDNESS, CHLORIDES, AND SULFATES.

PCBS WERE DETECTED IN WELLS SWMW-2,3,4,5,6,7 AND 7A IN BOTH SAMPLING ROUNDS WITH TOTAL PCB CONCENTRATIONS RANGING FROM 0.0032 PPM AT SWMW-3 (JANUARY 1989) TO 0.11 PPM IN WELL SWMW-5, ALSO IN JANUARY, 1989. PCBS WERE DETECTED IN WELL SWMW-8 AND 9 ONLY IN THE SECOND ROUND OF SAMPLES WITH TOTAL PCB CONCENTRATIONS OF 0.014 PPM AND 0.038 PPM, RESPECTIVELY. PCBS WERE NOT DETECTED IN AREA E WELL SEMW-1 OR UPGRADIENT WELL SWMW-1 FOR THE WASTEWATER TREATMENT FACILITY.

SEVERAL VOLATILE ORGANIC COMPOUNDS (CHLOROFORM, 1,1-DICHLOROETHANE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE TRICHLOROETHENE, AND TETRACHLOROETHENE) WERE DETECTED IN WELL SEMW-1 LOCATED IN AREA E, UPGRADIENT OF THE WASTEWATER TREATMENT FACILITY. TOTAL VOCS (EXCLUDING ACETONE) DETECTED IN SEMW-1 WERE 0.10 PPM (OCTOBER 1988) AND 0.107 PPM (JANUARY 1989).

IN THE WASTEWATER TREATMENT FACILITY WELLS, TOTAL 1,2-DICHLOROETHENE, TRICHLOROETHENE, AND TETRACHLOROETHENE WERE DETECTED IN WELLS SWMW-2 THROUGH SWMW-9 DURING BOTH SAMPLING EVENTS. IN ADDITION, TRICHLOROETHENE AND TETRACHLOROETHENE WERE DETECTED IN BACKGROUND WELL SWMW-1 DURING THE SECOND SAMPLING ROUND IN JANUARY 1989. THE TRICHLOROETHENE CONCENTRATION DETECTED IN SWMW-1 WAS 0.007 PPM.

IN ADDITION TO TOTAL 1,2-DICHLOROETHENE, TRICHLOROETHANE AND TETRACHLOROETHENE, SEVERAL OTHER VOCS (VINYL CHLORIDE, 1,1-DICHLOROETHENE, 1,1-DICHLOROETHANE, CHLOROFORM, 1,2-DICHLOROETHANE, CARBON TETRACHLORIDE AND BENZENE) WERE DETECTED AT LESS FREQUENT OCCURRENCES.

TOTAL VOC CONCENTRATIONS ARE INCLUDED IN TABLE 5-63. TOTAL VOC CONCENTRATIONS RANGED FROM NONE DETECTED DURING THE FIRST SAMPLING ROUND IN WELL SWMW-1 TO 3.306 PPM IN WELL SWMW-2 IN OCTOBER 1988.

TOTAL VOC CONCENTRATIONS IN WELL SWMW-9, LOCATED IMMEDIATELY UPGRADIENT OF THE INACTIVE LAGOON, AND WELLS SWMW-2 AND 3, LOCATED IMMEDIATELY DOWNGRADIENT OF THE INACTIVE LAGOON, RANGED FROM 0.608 PPM IN SWMW-3 TO 3.306 PPM IN SWMW-2. WELL SWMW-9 IS LOCATED APPROXIMATELY 45 FEET UPGRADIENT OF THE INACTIVE LAGOON. THE PRESENCE OF VOCS MAY BE THE RESULT OF DIRECT HYDROLOGIC CONNECTION (THROUGH FRACTURES) BETWEEN THE INACTIVE LAGOON AND THE SCREENED PORTION OF WELL SWMW-9. WELL SWMW-4, LOCATED DOWNGRADIENT OF THE INACTIVE LAGOON AND IMMEDIATELY UPGRADIENT OF THE STABILIZATION LAGOON, HAD TOTAL VOC CONCENTRATIONS OF 1.101 PPM, 1.86 PPM AND 1.95 PPM (DUPLICATE SAMPLE). TOTAL VOCS IN WATER TABLE WELLS SWMW-5,6,7 AND 8 RANGED FROM 0.095 PPM IN SWMW-8 TO 2.15 PPM IN SWMW-5 AND SHOW DECREASES IN CONCENTRATION, WITH DISTANCE DOWNGRADIENT FROM THE STABILIZATION LAGOON; HOWEVER, WELL SWMW-7A, SCREENED BELOW THE WATER TABLE ON TOP OF BEDROCK, HAD HIGHER TOTAL VOC CONCENTRATIONS THAN ADJACENT WATER TABLE WELL SWMW-7. DETECTED CONCENTRATIONS IN SWMW-7A (1.96 PPM AND 2.57 PPM) WERE THE HIGHEST OF THE FIVE DOWNGRADIENT WELLS FOR THE RESPECTIVE SAMPLING PERIODS.

DURING THE FIRST ROUND SAMPLING IN OCTOBER 1988, WELLS SWMW-4 AND SWMW-6 WERE ANALYZED FOR SEMI-VOLATILE AND PESTICIDE ORGANIC COMPOUNDS. NO SEMI-VOLATILE COMPOUNDS WERE DETECTED. HEPTACHLOR EPOXIDE WAS THE ONLY PESTICIDE ORGANIC COMPOUND DETECTED IN SWMW-4 (0.00021 PPM) AND SWMW-6 (0.00066 PPM) DURING FIRST ROUND SAMPLING. THESE ARE EXTREMELY LOW CONCENTRATIONS. SEMI-VOLATILE AND PESTICIDE ORGANICS COMPOUNDS WERE NOT INCLUDED IN THE LIST OF ANALYTICAL PARAMETERS FOR SECOND ROUND SAMPLES COLLECTED IN JANUARY 1989.

IN OCTOBER 1988, SAMPLES WERE OBTAINED FROM DOWNGRADIENT WELLS SWMW-4 AND 6 FOR INORGANIC COMPOUND ANALYSIS. TWELVE COMPOUNDS WERE DETECTED IN THE SAMPLE FOR WELL SWMW-4. TEN INORGANIC COMPOUNDS WERE DETECTED IN THE SAMPLE FOR SWMW-6. CONCENTRATIONS IN BOTH THE SAMPLES WERE LOW, THEREFORE, METALS WERE NOT INCLUDED IN THE ANALYTICAL PARAMETERS FOR THE SECOND ROUND GROUND WATER SAMPLES COLLECTED IN JANUARY 1989.

EPA WAS NOTIFIED OF THE ELIMINATION OF INORGANIC, SEMI-VOLATILE, AND PESTICIDE ORGANIC COMPOUNDS FROM THE ANALYTICAL PARAMETER LIST FOR SECOND ROUND SAMPLES IN A LETTER DATED JANUARY 10, 1989.

SEDIMENT SAMPLES WERE COLLECTED FROM DRAINAGE DITCHES AND SWALES NEAR THE WASTEWATER TREATMENT FACILITY. THESE SAMPLES WERE COLLECTED FROM NINE LOCATIONS (SWSD-3 THROUGH 11) ON JULY 13, 1988. SAMPLES WERE ANALYZED FOR PCBS. ANALYTICAL RESULTS ARE PRESENTED IN TABLE 5-84. SAMPLING SITES SWSD-3 THROUGH 7 ARE LOCATED IN A DRAINAGE DITCH ORIGINATING-NEAR THE PLANT FACILITY AND EXTENDS SOUTHWARD ALONG THE EAST SIDE OF THE INACTIVE LAGOON AND STABILIZATION LAGOON. SEDIMENT SAMPLING POINTS SWSD-8 AND SWSD-9 ARE LOCATED IN A DRAINAGE SWALE DOWNGRADIENT OF AREA 2 AND WERE SAMPLED TO DETERMINE IF PCBS HAVE MIGRATED FROM AREA B TO THE WASTEWATER TREATMENT FACILITY. DRAINAGE IN THIS SWALE ALSO DISCHARGES INTO THE OUTFALL DITCH TO THE STABILIZATION LAGOON. SAMPLES SWSD-10 AND SWSD-11 WERE COLLECTED IN THE OUTFALL DITCH SOUTH OF SANGAMO ROAD, DOWNGRADIENT OF THE WASTEWATER TREATMENT FACILITY.

PCBS WERE DETECTED IN NINE SEDIMENT SAMPLES. SAMPLING SITES SWSD-3, 4, 6 AND 8 ARE THE ONLY LOCATIONS WITH PCB CONCENTRATIONS GREATER THAN 50 PPM. SWSD-3, LOCATED UPGRADIENT FROM THE INACTIVE LAGOON, HAS A TOTAL PCB CONCENTRATION OF 1680 PPM. SAMPLING LOCATION SWSD-4, LOCATED ADJACENT TO THE EAST SIDE OF THE INACTIVE LAGOON, HAD A TOTAL PCB CONCENTRATION OF 2,700 PPM. SEDIMENT SAMPLE SWSD-5, LOCATED DOWNGRADIENT OF THE INACTIVE LAGOON, HAD A MUCH LOWER PCB CONCENTRATION OF 22.2 PPM. SWSD-6 AND SWSD-7, LOCATED DOWNSTREAM OF THE INACTIVE LAGOON AND ADJACENT TO THE ACTIVE LAGOON, HAS A TOTAL PCB CONCENTRATION OF 124 PPM AND 6.5 PPM, RESPECTIVELY. A TOTAL PCB CONCENTRATION OF 319 PPM WAS DETECTED AT SWSD-8. TOTAL PCB CONCENTRATIONS DECREASED FURTHER DOWNGRADIENT TO 19.7 PPM DETECTED IN SWSD-9.

TOTAL PCB CONCENTRATIONS OF 6.5 PPM AND 7.2 PPM (DUPLICATE SAMPLE) WERE DETECTED IN SWSD-10. A TOTAL PCB CONCENTRATION OF 24.8 PPM WAS DETECTED AT SAMPLING SITE SWSD-11.

#SSR

6.0 SUMMARY OF SITE RISKS

6.1 CONTAMINANTS OF CONCERN

A BASELINE RISK ASSESSMENT WAS CONDUCTED FOR THE PLANT SITE AND EACH OF THE OFF-SITE AREAS. THE CONTAMINATED MEDIA OF CONCERN ARE GROUNDWATER, SOIL AND SEDIMENT, SOLID WASTE AND SLUDGE. THE CONSTITUENTS OF CONCERN FOR THE MEDIA OF CONCERN IN EACH LOCATION ARE GIVEN IN TABLE 6-1. TABLE 6-2 PROVIDES THE CONCENTRATION RANGES FOR THE CONTAMINANTS OF CONCERN. THE MAJOR CONTAMINANT OF CONCERN AT THE SANGAMO SITE IS PCB. THE SURFACE SOIL PCB EXPOSURE POINT CONCENTRATION FOR EACH SITE WAS BASED ON THE MEAN OF THE DETECTED PCB CONCENTRATIONS FOR THE SURFACE SOIL SAMPLES

COLLECTED FOR THAT SITE. THE EXPOSURE POINT CONCENTRATIONS FOR OTHER CARCINOGENIC SURFACE SOIL CONTAMINANTS OF CONCERN ON THE PLANT SITE WERE ALSO BASED ON THE MEAN OF THE DETECTED SAMPLES. THE SURFACE SOIL EXPOSURE POINT CONCENTRATIONS ARE CONTAINED IN TABLE 6-3. THE EXPOSURE POINT CONCENTRATIONS FOR THE SOIL NONCARCINOGENIC CONTAMINANTS OF CONCERN WERE BASED ON THE HIGHEST DETECTED CONCENTRATIONS. LEAD WAS CONSIDERED TO BE A SOIL CONTAMINANT OF CONCERN AT THE WELBORN SITE. THE LEAD EXPOSURE POINT CONCENTRATION WAS BASED ON AN AVERAGE SOIL LEAD CONCENTRATION OF 31.4 MG/KG.

THE THREE CONTAMINANTS OF CONCERN AND THE EXPOSURE CONCENTRATIONS FOR THE SPRING LOCATED SOUTH OF THE PLANT SITE ARE TETRACHLOROETHENE (0.00084 MG/L), 1,2-DICHLOROETHENE (0.071 MG/L) AND TRICHLOROETHENE (0.2 MG/L). OTHER GROUNDWATER CONTAMINANTS WERE DETECTED IN THE PLUME ASSOCIATED WITH THE PLANT SITE AND THE OFF SITE AREAS. THE RANGE OF GROUNDWATER CONTAMINANT CONCENTRATIONS FOR THE SITE LOCATIONS IS CONTAINED IN TABLE 6-2. ALTHOUGH THE CONSUMPTION OF GROUNDWATER WAS NOT CONSIDERED TO BE A COMPLETE EXPOSURE PATHWAY IN THE PRP RISK ASSESSMENT, REGION IV DOES NOT AGREE WITH THIS CONCLUSION. SECTIONS 6.2 AND 6.4 CONTAIN MORE DISCUSSION ON THE GROUNDWATER EXPOSURE PATHWAY.

6.2 EXPOSURE ASSESSMENT

POTENTIAL EXPOSURE PATHWAYS ARE DIRECT CONTACT WITH CONTAMINATED SOIL AND SEDIMENTS, INHALATION OF CONTAMINATED AIR AND FUTURE CONSUMPTION OF CONTAMINATED GROUNDWATER. AN ADDITIONAL INDIRECT EXPOSURE PATHWAY COULD RESULT FROM LEACHING OF SURFACE AND SUBSURFACE CONTAMINANTS INTO THE GROUNDWATER AND THE SUBSEQUENT CONSUMPTION OF GROUNDWATER.

DIRECT CONTACT WITH SURFACE SOIL AND SEDIMENTS IS CONSIDERED TO BE A POTENTIALLY COMPLETE CURRENT EXPOSURE PATHWAY. DUE TO THE REMOTENESS OF THE SITES, DIRECT CONTACT WAS ASSUMED TO OCCUR ON A ONCE-PER WEEK BASIS AT MOST OF THE SITES. THE BREAZEALE SITE IS CONSIDERED A POTENTIAL FUTURE BUILDING SITE, AND THE JOHN TROTTER SITE IS CURRENTLY OCCUPIED, SO INTAKE LEVELS WERE BASED ON A DAILY EXPOSURE SCENARIO FOR THESE TWO

SITES.

FOR NONCARCINOGENIC EFFECTS, THE DIRECT CONTACT EXPOSURE SCENARIO WAS FOR CHILDREN CONSUMING 0.2 GRAMS OF SOIL PER DAY AND WEIGHING 17 KILOGRAMS. THE CARCINOGENIC DIRECT CONTACT DAILY INTAKE LEVEL WAS BASED ON BOTH THE INGESTION AND DERMAL CONTACT PATHWAYS. THE INGESTION PATHWAY ASSUMED A LIFETIME DAILY CONSUMPTION RATE OF 0.1 GRAMS OF SOIL BY A 70 KILOGRAM ADULT. THE DERMAL PATHWAY ASSUMED A 540 MILLIGRAMS PER EXPOSURE CONTACT RATE AND A 5 PERCENT ABSORPTION RATE OF PCBS THROUGH THE SKIN.

VOLATILIZATION OF CONSTITUENTS IS NOT CONSIDERED TO BE A SIGNIFICANT MIGRATION PATHWAY AT THE PLANT SITE OR AT THE OFF SITE AREAS. MEASURED PCB AND VOC CONCENTRATIONS IN AIR WERE BELOW DETECTION LIMITS AT BOTH THE PLANT AND OFF SITE AREAS. FOR THIS REASON, INHALATION WAS NOT

CONSIDERED TO BE A COMPLETE EXPOSURE PATHWAY. ONE EXCEPTION TO THIS WAS THE DODGENS OFF SITE AREA. ALTHOUGH THE SITE IS GRASS COVERED AND IN GENERAL FUGITIVE DUST GENERATION IS NOT A SIGNIFICANT EXPOSURE PATHWAY, THE GRASS AT THE SITE IS MOWED WITH A TRACTOR MOWER SEVERAL TIMES A YEAR DURING THE SUMMER MONTHS. THE TRACTOR OPERATOR COULD BE POTENTIALLY EXPOSED TO PCB CONTAINING DUST GENERATED BY THE MOWER. THE EXPOSURE FREQUENCY FOR THIS SCENARIO IS 10 DAYS A YEAR FOR 2 HOURS A DAY. THE BREATHING RATE WAS ASSUMED TO BE 1.3 M3/HOUR, 10 PERCENT FOR THE PERCENTAGE OF INHALED DUST INGESTED AND 30 PERCENT FOR THE PERCENTAGE OF PCBS ABSORBED FROM THE INGESTED DUST.

THE CONSUMPTION OF CONTAMINATED GROUNDWATER WAS NOT CONSIDERED TO BE A COMPLETE EXPOSURE PATHWAY IN THE RISK ASSESSMENT BECAUSE NO DOWNGRADIENT GROUNDWATER USERS HAVE BEEN IDENTIFIED AND TREATED WATER IS AVAILABLE TO ALL RESIDENCES DOWNGRADIENT OF THE PLANT SITE. HOWEVER, THE ON-SITE AQUIFER IS CLASSIFIED AS IIA AND THE AQUIFER IN THE OFF SITE AREAS IS CLASSIFIED AS 118, IMPLYING THAT THE ON-SITE AQUIFER IS CONSIDERED TO BE A CURRENT DRINKING WATER SOURCE AND THE OFF SITE AQUIFER IS A POTENTIAL SOURCE OF DRINKING WATER. THE CLASS II STATUS OF THE AQUIFER IN THE VICINITY OF THE SITE INDICATES THAT A FUTURE SCENARIO FOR THE CONSUMPTION OF GROUNDWATER SHOULD HAVE BEEN ADDRESSED IN THE RISK ASSESSMENT. HOWEVER, SINCE THIS WAS NOT DONE, THE NEED FOR GROUNDWATER REMEDIATION WILL BE ADDRESSED IN THE RISK CHARACTERIZATION SECTION OF THIS SUMMARY BY COMPARING GROUNDWATER CONCENTRATIONS FOR THE CONTAMINANTS OF CONCERN WITH THE APPROPRIATE MCLS OR MCLGS. HEALTH BASED NUMBERS ARE PROVIDED IN THE ABSENCE OF GROUNDWATER STANDARDS.

THE AREAS OF SOLID WASTE AND SLUDGE DISPOSAL WERE SAMPLED BOTH ON THE SURFACE AND BY SUBSURFACE BORINGS. THE SURFACE SAMPLES WERE INCORPORATED WITH THE OTHER SURFACE SOIL SAMPLES TO DETERMINE SURFACE SOIL EXPOSURE POINT CONCENTRATIONS. THE SUBSURFACE CONTAMINANTS POSE AN INDIRECT EXPOSURE PATHWAY THROUGH LEACHING TO GROUNDWATER AND THE SUBSEQUENT CONSUMPTION OF CONTAMINATED GROUNDWATER. THESE AREAS WILL BE REMEDIATED BASED ON SOIL CLEANUP CONCENTRATIONS FOR THE PROTECTION OF GROUNDWATER.

6.3 TOXICITY ASSESSMENT

CANCER POTENCY FACTORS (CPFS) HAVE BEEN DEVELOPED BY EPA'S CARCINOGENIC ASSESSMENT GROUP FOR ESTIMATING EXCESS LIFETIME CANCER RISKS ASSOCIATED WITH EXPOSURE TO POTENTIALLY CARCINOGENIC CHEMICALS. CPFS, WHICH ARE EXPRESSED IN UNITS OF (MG/KG-DAY)1, ARE MULTIPLIED BY THE ESTIMATED INTAKE OF A POTENTIAL CARCINOGEN, IN MG/KG-DAY, TO PROVIDE AN UPPER-BOUND ESTIMATE OF THE EXCESS LIFETIME CANCER RISK ASSOCIATED WITH EXPOSURE AT THAT INTAKE LEVEL. THE TERM "UPPER BOUND" REFLECTS THE CONSERVATIVE ESTIMATE OF THE RISK CALCULATED FROM THE CPF. USE OF THIS APPROACH MAKES UNDERESTIMATION OF THE ACTUAL CANCER RISK HIGHLY UNLIKELY. CANCER POTENCY FACTORS ARE DERIVED FROM THE RESULTS OF HUMAN EPIDEMIOLOGICAL STUDIES OR CHRONIC ANIMAL BIOASSAYS TO WHICH ANIMAL-TO-HUMAN EXTRAPOLATION AND UNCERTAINTY FACTORS HAVE BEEN APPLIED.

THE CPFS FOR THE SITE CONTAMINANTS OF CONCERN ARE CONTAINED IN TABLE 6-4.

REFERENCE DOSES (RFDS) HAVE BEEN DEVELOPED BY EPA FOR INDICATING THE POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM EXPOSURE TO CHEMICALS EXHIBITING NONCARCINOGENIC EFFECTS. RFDS, WHICH ARE EXPRESSED IN UNITS OF MG/KG-DAY, ARE ESTIMATES OF LIFETIME DAILY EXPOSURE LEVELS FOR HUMANS,INCLUDING SENSITIVE INDIVIDUALS. ESTIMATED INTAKES OF CHEMICALS FROM ENVIRONMENTAL MEDIA (E.G.1 THE AMOUNT OF A CHEMICAL INGESTED FROM CONTAMINATED DRINKING WATER) CAN BE COMPARED TO THE RFD. RFDS ARE DERIVED FROM HUMAN EPIDEMIOLOGICAL STUDIES OR ANIMAL STUDIES TO WHICH UNCERTAINTY FACTORS HAVE BEEN APPLIED (E.G., TO ACCOUNT FOR THE USE OF ANIMAL DATA TO PREDICT EFFECTS ON HUMANS). THESE UNCERTAINTY FACTORS HELP ENSURE THAT THE RFDS WILL NOT UNDERESTIMATE THE POTENTIAL FOR ADVERSE NONCARCINOGENIC EFFECTS TO OCCUR. THE RFDS FOR THE SITE CONTAMINANTS OF CONCERN ARE CONTAINED IN TABLE 6-4.

6.4 RISK CHARACTERIZATION

EXCESS LIFETIME CANCER RISKS ARE DETERMINED BY MULTIPLYING THE INTAKE LEVEL WITH THE CANCER POTENCY FACTOR. THESE RISKS ARE PROBABILITIES-HAT ARE GENERALLY EXPRESSED IN SCIENTIFIC NOTATION (E.G.,1 X (10-6) OR 1E-6). AN EXCESS LIFETIME CANCER RISK OF 1 X (10-6) INDICATES THAT, AS A PLAUSIBLE UPPER BOUND, AN INDIVIDUAL HAS A ONE IN A MILLION CHANCE OF DEVELOPING CANCER AS A RESULT OF SITE-RELATED EXPOSURE TO A CARCINOGEN OVER A 70-YEAR LIFETIME UNDER THE SPECIFIC EXPOSURE CONDITIONS AT A SITE. THE AGENCY CONSIDERS INDIVIDUAL EXCESS CANCER RISK IN THE RANGE OF (10-4) TO (10-6) AS PROTECTIVE; HOWEVER THE (10-6) RISK LEVEL IS GENERALLY USED AS THE POINT OF DEPARTURE FOR SETTING CLEANUP LEVELS OF SUPERFUND SITES.

POTENTIAL CONCERN FOR NONCARCINOGENIC EFFECTS OF A SINGLE CONTAMINANT IN A SINGLE MEDIUM IS EXPRESSED AS THE HAZARD QUOTIENT (HQ) (OR THE RATIO OF THE ESTIMATED INTAKE DERIVED FROM THE CONTAMINANT CONCENTRATION IN A GIVEN MEDIUM TO THE CONTAMINANT'S REFERENCE DOSE). BY ADDING THE HQS

FOR ALL CONTAMINANTS WITHIN A MEDIUM OR ACROSS ALL MEDIA TO WHICH A GIVEN POPULATION MAY REASONABLY BE EXPOSED, THE HAZARD INDEX (HI) CAN BE GENERATED. THE HI PROVIDES A USEFUL REFERENCE POINT FOR GAUGING THE POTENTIAL SIGNIFICANCE OF MULTIPLE CONTAMINANT EXPOSURES WITHIN A SINGLE MEDIUM OR ACROSS MEDIA.

THE GREATEST CURRENT SITE RISKS ARE ATTRIBUTABLE TO DIRECT CONTACT WITH PCBS IN THE SURFACE SOIL. THESE RISK LEVELS RANGE FROM 1.2 X (10-5) FOR THE BREAZEALE SITE TO 1.3 X (10-3) FOR AREA B OF THE PLANT SITE. THE CANCER RISK LEVELS ASSOCIATED WITH EXPOSURE TO PCBS IN SURFACE OIL ARE SUMMARIZED ON TABLE 6-5. THE PREDICTED RISK LEVELS FOR EXPOSURE TO SURFACE SOIL VOCS AT AREA B ARE LOW AND DO NOT MAKE A SIGNIFICANT CONTRIBUTION TO THE RISKS ASSOCIATED WITH EXPOSURE TO PCBS. THE HAZARD INDEX FOR DIRECT CONTACT WITH NONCARCINOGENS IN THE SURFACE SOIL AT THE PLANT SITE ARE BELOW UNITY (1.9 X (10-4)).

THE BASELINE RISK ASSOCIATED WITH GRASS MOWING FOR THE DODGENS SITE IS 8.2 X (10-8).

LEAD WAS DETECTED IN THE SOIL AT CONCENTRATIONS EXCEEDING BACKGROUND AT THE WELBORN SITE. HOWEVER, THE AVERAGE CONCENTRATION (31.4 MG/KG) IS WELL BELOW THE OSWER INTERIM DIRECTIVE (# 9355.4-02) RECOMMENDED RANGE (500 - 1000 MG/KG). IN ADDITION, THIS CONCENTRATION IS ALSO WELL BELOW THE SOIL LEAD CLEANUP CONCENTRATION THAT WOULD BE GENERATED BY USING EXPOSURE DEFAULT VALUES WITH THE EPA BAD UPTAKE/BIOKINETIC MODEL.

A BASELINE RISK WAS CALCULATED FOR THE DAILY CONSUMPTION OF WATER FROM A SPRING LOCATED DOWNGRADIENT FROM THE SITE. THE NONCARCINOGENIC RISK, OR HAZARD INDEX, WAS CALCULATED AT 0.11. THE CARCINOGENIC RISK WAS DETERMINED TO BE 7.5 X (10-5). ALTHOUGH THE RISK ASSOCIATED WITH THE FUTURE CONSUMPTION OF CONTAMINATED GROUNDWATER WAS NOT CALCULATED, THE APPROPRIATE GROUNDWATER STANDARDS AND HEALTH BASED NUMBERS ARE CONTAINED IN TABLE 6-6. A COMPARISON OF GROUNDWATER CONCENTRATIONS WITH THE NUMBERS IN THIS TABLE WILL ALLOW A DETERMINATION TO BE MADE CONCERNING WHICH GROUNDWATER CONTAMINANTS WILL REQUIRE REMEDIATION.

6.5 ENVIRONMENTAL RISKS

THE ENVIRONMENTAL RECEPTORS AT THE SANGAMO PLANT SITE AND OFF SITE AREAS WOULD PRIMARILY BE AFFECTED THROUGH SOIL AND SURFACE WATER SEDIMENT PATHWAYS. NO ENDANGERED SPECIES OR CRITICAL HABITATS ARE KNOWN TO OCCUR IN THE VICINITY OF THE SITE.

THE CONSTITUENTS IN THE SURFACE SOIL COULD IMPACT TERRESTRIAL ANIMALS. BURROWING ANIMALS, SUCH AS RODENTS, REPTILES, AND INSECTS MIGHT BE AFFECTED BY CONTAMINANTS IN THE BURIED WASTES.

THE SURFACE WATER DITCHES AT THE PLANT SITE AND THE DITCHES AND CREEKS ADJACENT TO THE OFF SITE AREAS ARE LOW IN VOLUME AND ARE NOT KNOWN TO CONTAIN EDIBLE FISH.

#DA

7.0 DESCRIPTION OF ALTERNATIVE 1: NO ACTION

7.1.1 DESCRIPTION

THE NO ACTION ALTERNATIVE IS RETAINED AS THE BASELINE CASE FOR RISK COMPARISON. NO REMEDIAL ACTIONS WOULD BE PERFORMED ON ANY OF THE MEDIA OF CONCERN (GROUNDWATER, SOIL, SLUDGE, AND SOLID WASTES) AT EITHER THE PLANT SITE OR THE OFF-SITE AREAS. WASTE DISPOSAL AREAS DEFINED DURING THE RI WOULD REMAIN IN THEIR PRESENT CONDITION. THE ONLY ACTIVE COMPONENT OF THIS ALTERNATIVE IS LONG-TERM GROUNDWATER AND SURFACE SOIL MONITORING. THIS PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE EFFECT OF WASTE CONSTITUENTS ON THE SITE OVER A 30-YEAR DESIGN LIFE.

GROUNDWATER QUALITY WOULD BE MONITORED SEMI-ANNUALLY BY SAMPLING AND ANALYSIS FOR VOLATILES, SEMI-VOLATILES, METALS, AND PCBS. ANNUALLY, SAMPLES WOULD BE COLLECTED AND ANALYZED FOR THE VOLATILE, SEMI-VOLATILE FRACTION OF THE TARGET COMPOUND LIST (TCL). DIOXINS AND FURANS WOULD ALSO BE ANALYZED ANNUALLY AT THE PLANT SITE. IF NEW COMPOUNDS ARE DETECTED, THEY WILL BE ADDED TO THE SEMI-ANNUAL MONITORING PROGRAM. HOWEVER, SINCE MANY OF THE GROUNDWATER MONITORING WELLS ARE LOCATED IN FRACTURED BEDROCK, THE WATER QUALITY DETERMINED BY ANALYSES OF SAMPLES FROM THESE FRACTURES MAY NOT INDICATE GROUNDWATER QUALITY IN OTHER UNCONNECTED FRACTURE SYSTEMS. THE GROUNDWATER QUALITY WOULD CHANGE AS NATURAL ATTENUATION DEGRADED THE WASTE CONSTITUENTS PRESENT IN THE WATER.

SURFACE SOIL MONITORING WOULD BE PERFORMED ANNUALLY TO EVALUATE MIGRATION OF PCBS. SAMPLES WOULD BE COLLECTED FROM EACH WASTE DISPOSAL LOCATION AT PLANT AND OFF-SITE AREAS. AS WITH THE GROUNDWATER MONITORING, A 30 YEAR PERIOD HAS BEEN USED AS A BASIS FOR COST ESTIMATION.

SANGAMO PLANT SITE

THIS PROGRAM WOULD INCLUDE EXISTING ON-SITE MONITORING WELLS AND OFF-SITE WELL. EPA HAS CLASSIFIED GROUNDWATER AS CLASS IIA ON THE PLANT PROPERTY. A 30-YEAR PERIOD HAS BEEN USED AS A BASIS FOR COST ESTIMATION. THE MONITORING PROGRAM HAS THE FOLLOWING ELEMENTS:

BACKGROUND WELLS: MONITORING OF THE FOLLOWING UPGRADIENT WELLS IS PROPOSED. WELLS SAMW-1, SBMW-1, AND SWMW-1 ARE LOCATED NEAR AREAS A, B, AND THE WASTEWATER TREATMENT FACILITY. AREAS C, D, E F, G, AND H ARE ON TOP OF A RIDGE AND NO UPGRADIENT WELLS ARE TOPOGRAPHICALLY POSSIBLE. BACKGROUND WELLS WILL SERVE AS POINTS OF COMPARISON FOR WATER QUALITY MONITORING RESULTS FROM THE WASTE DISPOSAL AREAS.

ON-SITE MONITORING WELLS: EXISTING WELLS SAMW-2 AND 3, SBMW-2 AND 3,

SDMW-1, 2, 3, AND 4, SCMW-5, SFMW-6, SGMW-7, 8, AND 9, SHMW-10, SEMW-1, SWMW-2, 3, 4, 5, 6, 7, 7A, 8, AND 9 ARE PROPOSED FOR LONG-TERM MONITORING. THESE WELLS ARE DOWNGRADIENT OF WASTE DISPOSAL AREAS.

OFF-PROPERTY MONITORING WELLS: SEVERAL WELLS (SPMW 1, 1A, 1B, 2, 3, 3A, 3B, 4, 5, AND 6) ARE PROPOSED FOR LONG-TERM DETECTION MONITORING. MONITORING WELLS SPMW-1, 1A, AND 1B WILL COMPRISE A NEST LOCATED SOUTH OF THE SITE ON THE SOUTH SIDE OF TOWN CREEK. WELL SPMW-2 WILL BE A BEDROCK WELL LOCATED BETWEEN AREAS C, D, F, G, AND H AND THE NIX SPRING. THE REMAINING WELLS WILL BE LOCATED NORTH OF THE SITE. MONITORING WELLS SPMW-3, 3A, AND 3B, WILL COMPRISE A MONITORING WELL NEST ON THE NORTH SIDE OF THE UNNAMED TRIBUTARY TO TWELVEMILE CREEK. WELLS SPMW-4, 5, AND 6 ARE BEDROCK WELLS AND WILL BE LOCATED IN DRAINAGE SWALES DOWNGRADIENT OF SITES C, D, F, G, AND H. WELL NESTS WILL CONSIST OF SHALLOW AND DEEP WELLS FOR MONITORING GROUNDWATER IN THE SAPROLITE AND ONE WELL TO

MONITOR GROUNDWATER IN BEDROCK.

THE SELECTION OF MONITORING WELLS FOR LONG-TERM MONITORING OF VARIOUS WASTE DISPOSAL AREAS IS BASED ON LOCATION. WELLS ARE GENERALLY LOCATED DOWNGRADIENT OF THE WASTE DISPOSAL AREAS. EACH CAN BE USED TO MONITOR CONSTITUENT CONCENTRATIONS DOWNGRADIENT OF THE WASTE DISPOSAL AREAS.

FOR THE NO ACTION ALTERNATIVE, SAMPLES WOULD BE COLLECTED SEMIANNUALLY AND ANALYZED FOR PCBS, TRICHLOROETHENE, TETRACHLOROETHENE, TOTAL 1,2-DICHLOROETHENE, 1,1,1-TRICHLOROETHANE, 1,1-DICHLOROETHENE, 1,1-DICHLOROETHANE, CHLOROFORM, BENZENE, AND 1,2,-DICHLOROETHANE. AS PART OF THE MONITORING PROGRAM, WATER LEVELS WOULD BE MEASURED TO ASSESS THE GROUNDWATER FLOW DIRECTION. THE MONITORING AND WELL MAINTENANCE PERIOD IS ASSUMED TO BE 30 YEARS.

EPA HAS CLASSIFIED GROUNDWATER AS CLASS IIB AT THE OFF-SITE AREAS.

BREAZEALE SITE

A GROUNDWATER MONITORING PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE EFFECT OF WASTE CONSTITUENTS AT THE BREAZEALE SITE ON GROUNDWATER OVER A 30-YEAR DESIGN LIFE. THIS PROGRAM WOULD INCLUDE EXISTING ON-SITE MONITORING WELLS. A 30-YEAR PERIOD HAS BEEN USED FOR COST ESTIMATION. THE MONITORING PROGRAM HAS THE FOLLOWING ELEMENTS:

BACKGROUND WELL: MONITORING OF UPGRADIENT WELL BRMW-1 IS PROPOSED. THIS WELL IS LOCATED TO THE NORTHWEST OF THE SITE AND WOULD SERVE AS A POINT OF COMPARISON FOR WATER QUALITY MONITORING RESULTS FROM THE SITE.

ON-SITE MONITORING WELLS: EXISTING WELLS BRMW-2, 2A, 3, 3A, 3B, 4, 4A, 5, 5A, 5B, 8, 8A, 10, 11, 12, 12A, 14, AND 14A ARE PROPOSED FOR LONG-TERM MONITORING. THESE WELLS ARE LOCATED DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION.

ON-SITE DETECTION MONITORINA WELLS: WELLS BRMW-7, 9, AND 13 ARE PROPOSED

FOR LONG-TERM DETECTION MONITORING. THESE WELLS ARE LOCATED TO THE EAST, WEST, AND SOUTH OF THE VOC PLUME.

WELLS SELECTED FOR LONG-TERM MONITORING OF THE BREAZEALE SITE ARE GENERALLY LOCATED DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION. THE SAMPLING PROGRAM FOR THE NO ACTION ALTERNATIVE WOULD BE PERFORMED ON A SEMI-ANNUAL BASIS AND THE RESULTS WOULD BE SUBMITTED IN SEMI-ANNUAL REPORTS. CHEMICAL ANALYSES ARE PROPOSED FOR PCBS, TRICHLOROETHENE, TETRACHLOROETHENE, BENZENE, TOLUENE, TOTAL 1,2-DICHLOROETHENE, 1,1,2,2-TETRACHLOROETHANE, BIS (2-ETHYLHEXYL) PHTHALATE, AND 1,1,1,-TRICHLOROETHANE. AS PART OF THE MONITORING PROGRAM, WATER LEVELS IN MONITORING WELLS WOULD BE MEASURED TO ASSESS THE GROUNDWATER FLOW DIRECTION. FOR COST ESTIMATING, THE WELL MONITORING AND MAINTENANCE PERIOD IS ASSUMED TO BE 30 YEARS.

NIX SITE

A GROUNDWATER MONITORING PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE EFFECT OF WASTE CONSTITUENTS AT THE NIX SITE ON GROUNDWATER OVER A 30-YEAR DESIGN LIFE. THIS PROGRAM WOULD INCLUDE EXISTING ON-SITE MONITORING WELLS. A 30-YEAR PERIOD HAS BEEN USED FOR COST ESTIMATION. THE MONITORING PROGRAM HAS THE FOLLOWING ELEMENTS:

BACKGROUND WELL: MONITORING OF UPGRADIENT WELL NXMW-1 IS PROPOSED. THIS WELL IS LOCATED TO THE NORTHEAST OF THE SITE AND WOULD SERVE AS A POINT OF COMPARISON FOR WATER QUALITY MONITORING RESULTS FROM THE SITE.

ON-SITE DETECTION MONITORING WELLS: WELLS NXMW 2, 3, AND 4 ARE PROPOSED FOR LONG-TERM DETECTION MONITORING. THESE WELLS ARE LOCATED TO THE NORTH, SOUTHEAST, AND WEST OF THE AREA OF WASTE DEPOSITION, RESPECTIVELY.

THE SAMPLING PROGRAM FOR THE NO ACTION ALTERNATIVE WOULD BE PERFORMED ON A SEMI-ANNUAL BASIS AND THE RESULTS WOULD BE SUBMITTED IN A SEMI-ANNUAL REPORTS. CHEMICAL ANALYSES ARE PROPOSED FOR PCBS. AS PART OF THE MONITORING PROGRAM, WATER LEVELS IN MONITORING WELLS WOULD BE MEASURED TO ASSESS THE GROUNDWATER FLOW DIRECTION. FOR COST ESTIMATING, THE WELL MONITORING AND MAINTENANCE PERIOD IS ASSUMED TO BE 30 YEARS.

DODGENS SITE

A GROUNDWATER MONITORING PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE EFFECT OF WASTE CONSTITUENTS AT THE DODGENS SITE ON GROUNDWATER OVER A 30-YEAR DESIGN LIFE. THIS PROGRAM WOULD INCLUDE EXISTING ON-SITE MONITORING WELLS. A 30 YEAR PERIOD HAS BEEN USED FOR COST ESTIMATION. THE MONITORING PROGRAM HAS THE FOLLOWING ELEMENTS:

BACKGROUND WELL: MONITORING OF UPGRADIENT WELL DGMW-1 IS PROPOSED. THIS WELL IS LOCATED TO THE WEST OF THE SITE AND WOULD SERVE AS A POINT OF COMPARISON FOR WATER QUALITY MONITORING RESULTS FROM THE SITE.

ON-SITE MONITORING WELLS: EXISTING WELLS DGMW-2, 3, AND 4 ARE PROPOSED FOR LONG-TERM MONITORING. THESE WELLS ARE LOCATED DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION.

ON-SITE DETECTION MONITORING WELLS: WELL DGMW-3A IS PROPOSED FOR LONG-TERM DETECTION MONITORING. THIS WELL IS LOCATED TO THE EAST OF THE AREA OF WASTE DEPOSITION NEAR MIDDLE PORK TWELVEMILE CREEK.

WELLS SELECTED FOR LONG-TERM MONITORING OF THE DODGENS SITE ARE LOCATED DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION. THE SAMPLING PROGRAM FOR THE NO ACTION ALTERNATIVE WOULD BE PERFORMED ON A SEMI-ANNUAL BASIS AND THE RESULTS WOULD BE SUBMITTED IN SEMI-ANNUAL REPORTS. CHEMICAL ANALYSES ARE PROPOSED FOR PCBS, TRICHLOROETHENE, TETRACHLOROETHENE, BIS (2-ETHYLHEXYL) PHTHALATE, CADMIUM, COPPER, LEAD, AND SILVER. AS PART OF

THE MONITORING PROGRAM, WATER LEVELS IN MONITORING WELLS WOULD BE MEASURED TO ASSESS THE GROUNDWATER FLOW DIRECTION. FOR COST ESTIMATING, THE WELL MONITORING AND MAINTENANCE PERIOD IS ASSUMED TO BE 30 YEARS.

CROSS ROADS SITE

A GROUNDWATER MONITORING PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE IMPACT OF THE CROSS ROADS SITE ON GROUNDWATER OVER A 30-YEAR DESIGN LIFE THIS PROGRAM WOULD INCLUDE EXISTING AND PROPOSED MONITORING WELLS. A 30-YEAR PERIOD HAS BEEN USED FOR COST ESTIMATION. THE MONITORING PROGRAM HAS THE FOLLOWING ELEMENTS:

BACKGROUND WELL: MONITORING OF UPGRADIENT WELL CRMW-1 IS PROPOSED. THIS WELL IS LOCATED NORTH OF THE SITE AND WILL SERVE AS A POINT OF COMPARISON FOR WATER QUALITY MONITORING RESULTS FROM THE SITE.

ON-SITE MONITORING WELLS: EXISTING WELLS CRMW-2, 3, AND 3A ARE PROPOSED FOR LONG-TERM MONITORING. THESE WELLS ARE LOCATED DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION.

ON-SITE DETECTION MONITORING WELLS: WELL NEST CRMW-4, 4A, AND CRMW-5, 5A ARE PROPOSED FOR LONG-TERM DETECTION MONITORING. THESE WELLS ARE LOCATED SOUTHEAST AND EAST OF THE AREA OF WASTE DEPOSITION, RESPECTIVELY.

THE SAMPLING PROGRAM FOR THE NO ACTION ALTERNATIVE WOULD BE PERFORMED ON A SEMI-ANNUAL BASIS AND THE RESULTS WOULD BE SUBMITTED IN SEMI-ANNUAL REPORTS. CHEMICAL ANALYSES ARE PROPOSED FOR PCBS, TRICHLOROETHENE, TETRACHLOROETHENE, TOTAL 1,2-DICHLOROETHENE, SILVER, CADMIUM, AND CYANIDE. AS PART OF THE MONITORING PROGRAM, WATER LEVELS IN MONITORING WELLS WOULD BE MEASURED TO ASSESS THE GROUNDWATER FLOW DIRECTION. FOR COST ESTIMATING, THE MONITORING AND WELL MAINTENANCE PERIOD IS ASSUMED TO BE 30 YEARS.

JOHN TROTTER SITE

A GROUNDWATER MONITORING PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE IMPACT OF WASTE CONSTITUENTS AT THE JOHN TROTTER SITE ON GROUNDWATER OVER A 30-YEAR PERIOD. THIS PROGRAM WOULD INCLUDE EXISTING ON-SITE MONITORING WELLS. A 30-YEAR PERIOD HAS BEEN USED FOR COST ESTIMATION. THE MONITORING PROGRAM HAS THE FOLLOWING ELEMENTS:

BACKGROUND WELL: MONITORING OF UPGRADIENT WELL JTMW-1 IS PROPOSED. THIS WELL IS LOCATED NORTH OF THE SITE AND WOULD SERVE AS A POINT OF COMPARISON FOR WATER QUALITY MONITORING RESULTS FROM THE SITE.

ON-SITE DETECTION MONITORING WELLS: JTMW-2, 3, 3A, AND 4 ARE PROPOSED FOR LONG-TERM DETECTION MONITORING. THESE WELLS ARE LOCATED SOUTH OF THE AREA OF WASTE DEPOSITION.

WELLS SELECTED FOR LONG-TERM GROUNDWATER MONITORING AT THE JOHN TROTTER SITE ARE LOCATED DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION. THE SAMPLING PROGRAM FOR THE NO ACTION ALTERNATIVE WOULD BE PERFORMED ON A SEMIANNUAL BASIS AND THE RESULTS WOULD BE SUBMITTED IN SEMI-ANNUAL REPORTS. CHEMICAL ANALYSES ARE PROPOSED FOR PCBS, TRICHLOROETHENE, TETRACHLOROETHENE, ANTIMONY, CADMIUM, COPPER, LEAD, AND SILVER. AS PART OF THE MONITORING PROGRAM, WATER LEVELS IN MONITORING WELLS WOULD BE MEASURED TO ASSESS THE GROUNDWATER FLOW DIRECTION. FOR COST ESTIMATING, THE WELL MONITORING AND MAINTENANCE PERIOD IS ASSUMED TO BE 30 YEARS.

WELBORN SITE

A GROUNDWATER MONITORING PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE EFFECT OF WASTE CONSTITUENTS AT THE WELBORN SITE ON GROUNDWATER OVER A 30-YEAR DESIGN LIFE. THIS PROGRAM WOULD INCLUDE EXISTING ON-SITE MONITORING WELLS. A 30-YEAR PERIOD HAS BEEN USED FOR COST ESTIMATION. THE MONITORING PROGRAM HAS THE FOLLOWING ELEMENTS:

BACKGROUND WELL: MONITORING OF UPGRADIENT WELL WBMW-1 IS PROPOSED. THIS WELLS IS LOCATED TO THE NORTHEAST OF THE SITE AND WOULD SERVE AS A POINT OF COMPARISON FOR WATER QUALITY MONITORING RESULTS FROM THE SITE.

ON-SITE DETECTION MONITORING WELLS: WELLS WBMW 2, 3, AND 4 ARE PROPOSED FOR LONG-TERM DETECTION MONITORING. THESE WELLS ARE LOCATED TO THE EAST AND SOUTH OF THE AREAS OF WASTE DEPOSITION.

WELLS SELECTED FOR LONG-TERM MONITORING OF THE WELBORN SITE ARE GENERALLY LOCATED DOWNGRADIENT OF THE AREA OF WASTE DEPOSITION. THE SAMPLING PROGRAM FOR THE NO ACTION ALTERNATIVE WOULD BE PERFORMED ON A SEMI-ANNUAL BASIS AND THE RESULTS WOULD BE SUBMITTED IN SEMI-ANNUAL REPORTS. CHEMICAL ANALYSES ARE PROPOSED FOR PCBS AND LEAD. AS PART OF THE MONITORING PROGRAM, WATER LEVELS IN MONITORING WELLS WOULD BE MEASURED TO ASSESS THE GROUNDWATER FLOW DIRECTION. FOR COST ESTIMATING, THE WELL MONITORING AND MAINTENANCE PERIOD IS ASSUMED TO BE 30 YEARS.

7.1.2 EFFECTIVENESS

THE NO-ACTION ALTERNATIVE WOULD NOT REDUCE THE TOXICITY MOBILITY OR VOLUME OF CONTAMINATED MEDIA AT THE SITE. SINCE MONITORING IS THE ONLY COMPONENT OF THIS ALTERNATIVE, THERE WOULD BE NO INCREASE IN PROTECTIVENESS TO HUMAN HEALTH OR THE ENVIRONMENT.

7.2 ALTERNATIVE 2: LIMITED ACTION

7.2.1 DESCRIPTION

THE LIMITED ACTION ALTERNATIVE ESTABLISHES INSTITUTIONAL MEASURES TO LIMIT EXPOSURE PATHWAYS IN THE FOUR AFFECTED MEDIA: GROUNDWATER, SOIL, SLUDGE, AND SOLID WASTES. THESE INSTITUTIONAL MEASURES INCLUDE THE FOLLOWING:

* RESTRICTIONS ON GROUNDWATER USE,

* FENCING TO LIMIT ACCESS TO AFFECTED SOLID MATERIALS, AND

* DEED RESTRICTIONS TO CONTROL FUTURE LAND USE.

GROUNDWATER

AS PROPOSED IN THIS ALTERNATIVE, LIMITED ACTION ON GROUNDWATER WOULD BE USED ONLY FOR THE PLANT, CROSS ROADS, BREAZEALE, AND DODGENS SITES.

LIMITED ACTION AT THESE LOCATIONS WOULD CONSIST OF GROUNDWATER ACCESS RESTRICTIONS, PROVISIONS FOR ONE CONNECTION TO PUBLIC WATER SUPPLY, AND GROUNDWATER MONITORING. ACCESS TO GROUNDWATER WOULD BE CONTROLLED THROUGH DEED RESTRICTIONS. PUBLIC WATER IS AVAILABLE THROUGHOUT THE AREA. LONG-TERM MONITORING WOULD BE PERFORMED AS DESCRIBED IN ALTERNATIVE 1, NO ACTION.

SOILS, SOLID WASTES, AND SLUDGE

LIMITED ACTION FOR SOILS, SOLID WASTES, AND SLUDGE AT EACH SITE WOULD CONSIST OF ACCESS CONTROL THROUGH FENCING AND DEED RESTRICTIONS. THE AREAS CONTAINING SOILS, SOLID WASTES, AND SLUDGE WITH PCB CONCENTRATIONS EXCEEDING 25 PPM WOULD BE FENCED. THE FENCE WOULD CONSIST OF SIX-FOOT HIGH WELDED WIRE WITH ONE STRAND OF BARBED WIRE EXTENDING ALONG THE TOP. THE SITES WOULD BE POSTED AND GATES WOULD BE KEPT LOCKED. IN ADDITION TO FENCING, LEGAL ACTIONS WOULD BE IMPLEMENTED TO PROVIDE DEED RESTRICTIONS CONCERNING ACCESS AND FUTURE SITE USE.

7.2.2 EFFECTIVENESS

FENCES INSTALLED AROUND THE AFFECTED AREAS WOULD PREVENT DIRECT HUMAN CONTACT WITH AFFECTED MATERIAL, BUT WOULD NOT REDUCE POTENTIAL MIGRATION BY SURFACE EROSION. INHALATION OF WASTE CONSTITUENTS WAS NOT FOUND IN

THE RI TO BE AN EXPOSURE PATHWAY.

LIMITED ACTION ON GROUNDWATER WOULD RESTRICT FUTURE USE AND CONSUMPTION OF GROUNDWATER IN AND AROUND THE AFFECTED AREAS (PLANT, BREAZEALE, DODGENS, AND CROSS ROADS) THROUGH INSTITUTIONAL CONTROLS. AS DISCUSSED IN SECTION 7.1.2, NATURAL ATTENUATION OF WASTE CONSTITUENTS IN FRACTURED BEDROCK MAY CONTINUE TO LOWER THE CONCENTRATIONS OF THOSE CONSTITUENTS AND THOSE OF THEIR DEGRADATION PRODUCTS.

7.3 ALTERNATIVE 3: LIMITED ACTION WITH CONTAINMENT OF SOLIDS

7.3.1 DESCRIPTION

THIS ALTERNATIVE COMBINES THE INSTITUTIONAL CONTROLS FOR GROUNDWATER AND SOLID MATERIALS THAT ARE DESCRIBED IN SECTION 7.2.1, WITH CONTAINMENT OF

AFFECTED SOLID MATERIALS BY CAPPING. TABLE 7-1 CONTAINS ESTIMATED VOLUMES OF AFFECTED MATERIAL. THIS ALTERNATIVE WOULD CONTAIN IN PLACE THE TOTAL VOLUME OF SOLIDS. THE PURPOSE OF CONTAINMENT IS TO REDUCE CONTACT OF WASTE CONSTITUENTS WITH RECEPTOR POPULATIONS AND THE ENVIRONMENT. REDUCTION WOULD BE ACCOMPLISHED BY MINIMIZING INFILTRATION OF WASTE CONSTITUENTS INTO THE GROUNDWATER, INHIBITING EROSION OF THE CONSTITUENTS, AND BY PROVIDING A BARRIER TO DIRECT CONTACT.

CONTAINMENT WOULD LEAVE AFFECTED SOILS IN PLACE. A CAP OVER AFFECTED MATERIALS AT THE SURFACE WOULD REDUCE CONTACT BETWEEN PERCOLATING WATER AND WASTE CONSTITUENTS, THEREBY REDUCING LEACHATE PRODUCTION. IN ADDITION, A CAP INSTALLED OVER THE AFFECTED MATERIALS WOULD PREVENT EROSION OF WASTE CONSTITUENTS BY WIND OR WATER. SITES REQUIRING CONTAINMENT WOULD BE GRADED TO PROVIDE SURFACE DRAINAGE AROUND AND AWAY FROM CONTAINED SOLIDS. A CONTAINMENT COVER WOULD REQUIRE MAINTENANCE AND INSPECTION.

THE ALTERNATIVE WOULD BE IMPLEMENTED AT THE PLANT AND OFF-SITE AREAS.

THE FOLLOWING TWO DESIGNS ARE BEING CONSIDERED FOR THE COVER:

OPTION 3A - COMPOSITE COVER

THE COMPOSITE COVER OPTION WOULD INCLUDE A CAP CONSISTING OF THE FOLLOWING COMPONENTS:

* 12 INCHES OF TOPSOIL

* 2 FEET OF COMPACTED CLAY

* A LAYER OF GEOTEXTILE MATERIAL

THE CLAY LAYER WOULD BE COMPACTED TO REDUCE PERMEABILITY TO LESS THAN 1 X (10-7) CM/SEC. THE FINAL SURFACE CONTOURS OF THE CAP WOULD BE GRADED TO PROMOTE RUNOFF RATHER THAN INFILTRATION DURING RAINFALL.

THE COMPOSITE COVER WOULD BE SOWN WITH SHALLOW ROOTED GRASSES TO MINIMIZE CAP EROSION. GRASSES WOULD BE SELECTED THAT PREVENTED PENETRATION OF THE CLAY LAYER BY THE ELEMENTS.

OPTION 3B - MULTI-MEDIA COVER

THE MULTI-MEDIA COVER OPTION WOULD INCLUDE A CAP CONSISTING OF THE FOLLOWING COMPONENTS:

* 6 INCHES OF TOPSOIL

* 18 INCHES OF ROOTING ZONE SOIL

* 1 LAYER OF GEOTEXTILE

* 1 LAYER OF DRAINAGE MATERIAL

* 1 LAYER OF FLEXIBLE MEMBRANE LINER

* 2 FEET OF CLAY

THE MULTI-MEDIA COVER DESIGN COMPLIES WITH SC DHEC REQUIREMENTS FOR HAZARDOUS WASTE COVER SYSTEMS AND WOULD PERFORM IN ACCORDANCE WITH US EPA MINIMUM TECHNOLOGY GUIDANCE. LIKE THE COMPOSITE COVER OPTION, THE MULTI-MEDIA COVER WOULD BE GRADED TO PROMOTE SURFACE DRAINAGE AND SOWN WITH SHALLOW-ROOTED GRASSES.

CONTAINMENT OF SLUDGE IN THE ACTIVE LAGOON WOULD BE ACCOMPLISHED BY PLACEMENT OF A BENTONITE COVER. THE BENTONITE COVER WOULD BE APPROXIMATELY SIX INCHES THICK AND WOULD BE PLACED OVER THE ENTIRE SLUDGE LAYER IN THE LAGOON. THIS ACTION WOULD BE TAKEN TO SUPPLEMENT THE EXISTING UNCONSOLIDATED BENTONITE COVER AND WOULD ENABLE THE PRESENT TREATMENT SYSTEM TO CONTINUE OPERATION. SLUDGE IN THE INACTIVE LAGOON WOULD BE COVERED IN THE SAME MANNER.

7.3.2 EFFECTIVENESS

THE SHORT-TERM EFFECTIVENESS OF ALTERNATIVE 3 WOULD BE PROVIDED BY USING CONSTRUCTION METHODS AND PRACTICES THAT MINIMIZE THE MOVEMENT OF WASTE CONSTITUENTS. LONG-TERM PROTECTIVENESS WOULD BE PROVIDED THROUGH NATURAL DEGRADATION OF WASTE CONSTITUENTS AND BY CONTROLLING THE FOLLOWING MIGRATION ROUTES:

* PARTICULATE RELEASES TO THE AIR,

* DIRECT CONTACT WITH AFFECTED MEDIA,

* GROUND SURFACE RUNOFF OF AFFECTED MATERIALS,

* SURFACE WATER INFILTRATION INTO AFFECTED SOIL OR WASTES AND SUBSEQUENT, MIGRATION THROUGH GROUNDWATER.

COMPARED TO A COMPOSITE COVER, THE MULTI-MEDIA COVER PROVIDES GREATER LONG-TERM EFFECTIVENESS BY SUPPLYING A MORE SUBSTANTIAL BARRIER TO INFILTRATION. RESULTS OF THE HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE (HELP) COMPUTER PROGRAM SHOW THAT OPTION A WOULD REDUCE INFILTRATION BY APPROXIMATELY 92 PERCENT AND OPTION B WOULD REDUCE INFILTRATION BY APPROXIMATELY 99 PERCENT. HOWEVER, SINCE THE PRIMARY OBJECTIVE IS ELIMINATION OF DIRECT CONTACT WITH WASTE CONSTITUENTS, THE SMALL INCREASE IN INFILTRATION ALLOWED BY A COMPOSITE COVER DOES NOT ELIMINATE IT FROM CONSIDERATION.

MONITORING EFFLUENT FROM THE LAGOON HAS SHOWN THE COVER TO BE EFFECTIVE IN ELIMINATING MIGRATION OF PCBS THROUGH WATER. PLACEMENT OF ADDITIONAL

BENTONITE WOULD BE CARRIED OUT TO SUPPLEMENT THE EXISTING COVER.

7.4 ALTERNATIVE 4: LIMITED ACTION WITH CONTAINMENT OF SOIL AND SLUDGE AND OFF-SITE DISPOSAL OF SOLID WASTES

7.4.1 DESCRIPTION

ALTERNATIVE 4 CONSISTS OF THE FOLLOWING COMPONENTS: LIMITED ACTION FOR GROUNDWATER COMBINED WITH CAPPING OF SOIL AND SLUDGE AS DESCRIBED IN SECTIONS 7.2.1 AND 7.3.1 AND OFF-SITE DISPOSAL OF SOLID WASTES. ON THE BASIS OF INFORMATION COLLECTED DURING THE RI PHASE I, APPROXIMATELY 2,900 CUBIC YARDS OF SOLID WASTES WOULD BE EXCAVATED, PRE-PROCESSED, AND TRANSPORTED OFF SITE FOR TREATMENT BY THERMAL DESTRUCTION OR DISPOSAL IN A TSCA SECURE CHEMICAL LANDFILL. USING A TYPICAL DENSITY OF 1.3 TONS/CUBIC YARD, THE TOTAL WEIGHT OF EXCAVATED SOLID WASTE WOULD BE APPROXIMATELY 3,800 TONS. THIS AVERAGE DENSITY WAS APPROXIMATELY THAT OF SOLID WASTES REMOVED FROM AREA D OF THE PLANT SITE. ALL REMAINING SOIL AND SLUDGE VOLUMES WOULD BE CAPPED.

THIS ALTERNATIVE INCLUDES OFF-SITE DISPOSAL BY BOTH INCINERATION AND LANDFILLING TO INCREASE IMPLEMENTABILITY THROUGH MAXIMIZING THE POTENTIAL FOR AVAILABLE COMMERCIAL TREATMENT AND DISPOSAL CAPACITY. THERMAL DESTRUCTION OF WASTES WOULD OCCUR IN A PERMITTED ROTARY KILN INCINERATOR OWNED BY A COMMERCIAL VENDOR. TO ANALYZE THIS ALTERNATIVE, AN ASSUMPTION WILL BE MADE THAT APPROXIMATELY TEN PERCENT OF THE SOLID WASTE (380 TONS) WOULD BE HAULED TO AN INCINERATOR. THE INCINERATOR NEAREST THE SITE IS APPROXIMATELY 850 MILES AWAY. AN ASSUMPTION WILL ALSO BE MADE THAT APPROXIMATELY 90 PERCENT (3,400 TONS) OF SOLID WASTES WOULD BE HAULED TO A LANDFILL. THE LANDFILL CONSIDERED IS APPROXIMATELY 500 MILES FROM THE SITE.

PERCENTAGES OF SOLID WASTE SUITABLE FOR LANDFILLING AND INCINERATION ARE BASED ON THE CLASSIFICATIONS OF WASTES EXCAVATED FROM AREA D OF THE PLANT SITE. THESE WASTES WERE EXCAVATED AND SEGREGATED ACCORDING TO SIZE AND TYPE.

THE SELECTED WASTE HAULER AND DISPOSAL FACILITY WILL BE IN COMPLIANCE WITH APPLICABLE FEDERAL (RCRA AND TSCA) AND APPROPRIATE STATE ENVIRONMENTAL AND PUBLIC HEALTH STATUTES. IF NECESSARY, RCRA MANIFESTS REQUIRED UNDER 40 CFR PARTS 262 AND 263 WILL BE COMPLETED FOR ALL WASTES SHIPPED OFF-SITE. IN ADDITION, THE FACILITY WILL COMPLY WITH APPLICABLE HAZARDOUS WASTE GENERATOR REQUIREMENTS UNDER 40 CFR PART 262.

THIS ALTERNATIVE WOULD BE IMPLEMENTED AT THE PLANT AND OFF-SITE AREAS.

7.4.2 EFFECTIVENESS

THE EFFECTIVENESS OF LIMITED GROUNDWATER ACTION WAS DISCUSSED IN THE DESCRIPTION FOR ALTERNATIVE 2, AND IS THE SAME FOR THIS ALTERNATIVE. SHORT-TERM EFFECTIVENESS DURING WASTE REMOVAL AND SOIL CAPPING IS

PROVIDED BY CONSTRUCTION TECHNIQUES THAT MINIMIZE HANDLING AND REDUCE THE DISPERSION OF WASTE CONSTITUENTS DURING CONTAINMENT AND EXCAVATION ACTIVITIES. EXCAVATION AND MOVEMENT OF SOLID WASTES WOULD RESULT IN A PERIOD DURING WHICH THE POTENTIAL FOR ADDITIONAL EXPOSURE WOULD EXIST. USE OF MEASURES FOR RUN-OFF PREVENTION AND DUST CONTROL WOULD PROVIDE PROTECTION TO HUMAN HEALTH AND THE ENVIRONMENT DURING CONSTRUCTION. NEITHER TOXICITY NOR VOLUME OF GROUNDWATER, SOIL, OR SLUDGE MATERIALS WOULD BE REDUCED BY IMPLEMENTATION OF THIS ALTERNATIVE.

OFF-SITE MANAGEMENT OF WASTES BY LANDFILLING WOULD NOT REDUCE THE TOXICITY OR VOLUME OF THE MATERIALS. MOBILITY OF WASTE CONSTITUENTS REMOVED WOULD BE REDUCED. HAULING WASTES OFF-SITE CO POTENTIALLY EXPOSE THOSE PERSONS USING THE SAME ROADS, OR LIVING OR WORKING ALONG THE ROUTE, TO AFFECTED MATERIALS.

LONG-TERM EFFECTIVENESS WOULD BE PROVIDED BY PROPER CAP MAINTENANCE AND THE REMEDIATION ACHIEVED BY WASTE REMOVAL AND OFF-SITE TREATMENT OR DISPOSAL. VOLUME AND TOXICITY OF AFFECTED SOIL AND SLUDGE WOULD NOT BE ALTERED BY THE TECHNIQUES USED IN THIS ALTERNATIVE.

FOR CONTAINMENT OF SOILS AND SLUDGES, LONG-TERM PROTECTION WOULD BE PROVIDED-THROUGH THE CONTROL OF SEVERAL MIGRATION ROUTES AS FOLLOWS:

* PARTICULATE RELEASES TO THE AIR,

* DIRECT CONTACT WITH AFFECTED MEDIA,

* GROUND SURFACE RUNOFF OF AFFECTED SEDIMENTS,

* SURFACE WATER INFILTRATION INTO AFFECTED SOIL OR WASTES AND SUBSEQUENT MIGRATION THROUGH GROUNDWATER.

HOWEVER, THIS ALTERNATIVE WOULD NOT CHANGE THE CHARACTERISTICS OF THE AFFECTED SOIL AND SLUDGE AS DESCRIBED IN SECTION 7.3.1.

7.5 ALTERNATIVE 5: LIMITED GROUNDWATER ACTION WITH ON-SITE DISPOSAL OF SOLIDS

7.5.1 DESCRIPTION

THE COMPONENTS OF THIS ALTERNATIVE INCLUDE THE MEASURES DESCRIBED IN SECTION 7.2.1 FOR LIMITED ACTION ON GROUNDWATER AND EXCAVATION AND DISPOSAL OF AFFECTED SOLID MATERIALS: SOIL, SLUDGE, AND SOLID WASTES. SLUDGE FROM THE ACTIVE LAGOON WOULD BE DREDGED AND MECHANICALLY DEWATERED. SOILS AND SOLID WASTES CONTAINING GREATER THAN 25 PPM OF PCBS WOULD BE EXCAVATED AND TRANSPORTED TO AN ON-SITE TSCA UNIT DESIGNED AND CONSTRUCTED SPECIFICALLY FOR THE DISPOSAL OF THESE MATERIALS. A LANDFILL CLOSURE WOULD BE IMPLEMENTED AFTER THE DISPOSAL IS COMPLETE. THIS ALTERNATIVE WOULD BE IMPLEMENTED AT ALL LOCATIONS.

EVALUATION OF ALTERNATIVE 5 IS BASED ON EXCAVATION AND DISPOSAL OF THE FOLLOWING VOLUMES OF AFFECTED MATERIALS:

AN ON-SITE, DOUBLE-LINED LANDFILL WOULD BE CONSTRUCTED FOR DISPOSAL OF AFFECTED SOLIDS FOR A CAPACITY OF 93,000 CUBIC YARDS, WHICH TAKES INTO ACCOUNT A 25 PERCENT EXPANSION OF 74,100 CUBIC YARDS OF SOLIDS AFTER EXCAVATION. LANDFILL DIMENSIONS WOULD BE APPROXIMATELY 400 FEET BY 300 FEET AT GRADE. THE DEPTH OF EXCAVATION BELOW GROUND SURFACE WOULD BE APPROXIMATELY 14 FEET, AND THE BERM HEIGHT AROUND THE LANDFILL WOULD BE APPROXIMATELY 17 FEET.

THE LANDFILL WOULD BE CONSTRUCTED ACCORDING TO REGULATORY REQUIREMENTS OF THE STATE OF SOUTH CAROLINA AND THE US EPA. THESE REQUIREMENTS INCLUDE CONSTRUCTION OF A DOUBLE LINER WITH A LEACHATE COLLECTION SYSTEM ABOVE AND BETWEEN THE LINERS. THE TOP LINER MUST PREVENT THE MIGRATION OF WASTE CONSTITUENTS INTO THE LOWER LINER. THE BOTTOM LINER MUST PREVENT MIGRATION OF WASTE CONSTITUENTS. SOUTH CAROLINA CODE R.61-79.264.301 (C) REQUIRES A THREE-FEET THICK LAYER OF RECOMPACTED CLAY OR OTHER NATURAL MATERIAL AS A BOTTOM LINER. THE PERMEABILITY MUST BE NO MORE THAN 1 X (10-7) CENTIMETERS PER SECOND. THE LANDFILL CAP MUST BE LESS PERMEABLE THAN THE SOILS IMMEDIATELY BELOW THE LANDFILL.

LANDFILL OPERATION AND MAINTENANCE (O&M) WOULD INCLUDE A NUMBER OF TASKS NECESSARY TO PROTECT THE INTEGRITY OF THE DISPOSAL UNIT. QUARTERLY MAINTENANCE WOULD BE PERFORMED ON THE ACCESS ROAD, THE LEACHATE COLLECTION AND TREATMENT SYSTEM, AND THE LANDFILL, WHICH IS EXPECTED TO COVER APPROXIMATELY THREE ACRES. GROUNDWATER MONITORING WOULD BE PERFORMED SEMIANNUALLY. THE ACTIVE MAINTENANCE PERIOD USED FOR ESTIMATING O&M COSTS IS 30 YEARS.

7.5.2 EFFECTIVENESS

THE EFFECTIVENESS OF LIMITED ACTION ON GROUNDWATER WAS DISCUSSED IN SECTION 7.2.2 AND IS SIMILAR TO THAT PROVIDED BY THIS ALTERNATIVE. THE SHORT-TERM EFFECTIVENESS, DURING IMPLEMENTATION OF THIS ALTERNATIVE FOR

EXCAVATION AND ON-SITE DISPOSAL OF SOLID MATERIALS, WOULD BE PROVIDED BY THE USE OF EXCAVATION TECHNIQUES THAT MINIMIZE HANDLING AND REDUCE THE DISPERSION OF WASTE CONSTITUENTS. THE LARGE VOLUME OF MATERIAL THAT WOULD BE MOVED WOULD RESULT IN AN EXTENDED PERIOD DURING WHICH THE POTENTIAL FOR EXPOSURE WOULD EXIST. USE OF MEASURES FOR THE PREVENTION OF RUN-OFF AND THE CONTROL OF DUST WOULD PROVIDE SOME PROTECTION TO HUMAN HEALTH AND THE ENVIRONMENT DURING CONSTRUCTION.

THE LONG-TERM EFFECTIVENESS OF THIS ALTERNATIVE WOULD BE PROVIDED BY PROPER MAINTENANCE OF THE ON-SITE LANDFILL. NEITHER THE VOLUME NOR THE TOXICITY OF AFFECTED MATERIALS WOULD BE ALTERED BY THE TECHNIQUES USED IN THIS ALTERNATIVE. REMOVAL OF SOURCE MATERIALS WOULD PREVENT FURTHER MIGRATION OF CONTAMINANTS INTO THE AQUIFER.

7.6 ALTERNATIVE 6: LIMITED GROUNDWATER ACTION WITH OFF-SITE DISPOSAL OF

SOLIDS

7.6.1 ALTERNATIVE 6 CONSISTS OF LIMITED ACTION ON GROUNDWATER AS DESCRIBED IN SECTION 7.2.1; EXCAVATION OF AFFECTED SOLID MATERIALS, AS DESCRIBED IN SECTION 7.5.1, AND OFF-SITE DISPOSAL IN A SECURE TSCA LANDFILL. THE CONCEPTUAL LAYOUT OF THIS ALTERNATIVE WOULD BE THE SAME AS THAT FOR ALTERNATIVE 5, EXCEPT THAT ONCE EXCAVATED, THE MATERIAL WOULD BE TAKEN OFF-SITE.

SOLID MATERIALS WOULD BE EXCAVATED, LOADED DIRECTLY ONTO TRUCKS, AND TRANSPORTED TO THE SELECTED LANDFILL. LAGOON SLUDGE WOULD BE EXCAVATED, DEWATERED, AND STOCKPILED. THE STOCKPILED SLUDGE WOULD THEN BE HAULED OFF-SITE. WATER COLLECTED DURING SLUDGE DEWATERING WOULD BE TRANSPORTED OFF-SITE FOR TREATMENT.

THE SELECTED WASTE HAULER AND THE DISPOSAL FACILITY WILL BE IN COMPLIANCE WITH APPLICABLE FEDERAL AND STATE ENVIRONMENTAL AND PUBLIC HEALTH STATUTES. IF NECESSARY, RCRA MANIFESTS REQUIRED UNDER 40 CFR PARTS 262 AND 263 WILL BE COMPLETED FOR ALL WASTES SHIPPED OFF-SITE. IN ADDITION, THE FACILITY WILL COMPLY WITH APPLICABLE HAZARDOUS WASTE GENERATOR REQUIREMENTS UNDER 40 CFR PARTS 262.

TRANSPORTING VEHICLES WILL BE APPROVED BY DOT AND WILL DISPLAY THE PROPER DOT PLACARD. FOR ESTIMATED COST, IT IS ASSUMED THAT 90 PERCENT OF THE MATERIAL CAN BE HANDLED BY A FACILITY APPROXIMATELY 500 MILES FROM THE SANGAMO PLANT SITE. THE REMAINING TEN PERCENT OF THE SOLID WASTES WOULD BE TRANSPORTED APPROXIMATELY 850 MILES TO AN INCINERATOR.

7.6.2 EFFECTIVENESS

THE EFFECTIVENESS OF EXCAVATION COMBINED WITH LIMITED ACTION ON GROUNDWATER WAS DISCUSSED IN THE DESCRIPTION FOR ALTERNATIVE 5. IT REMAINS UNCHANGED FOR THIS ALTERNATIVE.

OFF-SITE MANAGEMENT OF WASTES BY LANDFILLING WOULD NOT REDUCE THE

TOXICITY OR VOLUME OF MATERIALS. HOWEVER, LONG-TERM MOBILITY OF WASTE CONSTITUENTS WOULD BE REDUCED. HAULING WASTES OFF-SITE COULD POTENTIALLY EXPOSE THOSE PERSONS USING THE SAME ROADS, OR LIVING OR WORKING ALONG THE ROUTE, TO AFFECTED MATERIALS.

7.7 ALTERNATIVE 7: TREATMENT OF GROUNDWATER WITH ON-SITE DISPOSAL OF SOLIDS

7.7.1 DESCRIPTION

ALTERNATIVE 7 IS COMPRISED OF THE FOLLOWING TWO COMPONENTS:

1) SOLID MATERIAL REMEDIATION WHICH INCLUDES EXCAVATION AND DISPOSAL IN A SECURE TSCA LANDFILL CONSTRUCTED ONSITE AS DESCRIBED IN SECTION 7.5.1. THIS REMEDIATION TECHNIQUE

HAS BEEN DISCUSSED AND NEEDS NO FURTHER EXPLANATION FOR THE PURPOSES OF THIS ALTERNATIVE.

2) GROUNDWATER REMEDIATION WHICH CONSISTS OF GROUNDWATER COLLECTION, TREATMENT, AND DISCHARGE AT THE PLANT, BREAZEALE, DODGENS AND CROSS ROADS SITES.

THE GROUNDWATER REMEDIATION TECHNIQUES DISCUSSED IN THIS SECTION ARE APPLICABLE TO THE PLANT, BREAZEALE, DODGENS AND CROSS ROADS SITES.

GROUNDWATER COLLECTION AND TREATMENT IS NOT NECESSARY AT THE JOHN TROTTER, NIX AND WELBORN SITES. A DESCRIPTION OF THE COMPONENTS OF LIMITED GROUNDWATER ACTION THAT WOULD BE PERFORMED AT THESE THREE OFF-SITE AREAS APPEARS IN SECTION 7.2.1. EXCAVATION OF ALL SOLID MATERIALS CONTAINING GREATER THAN 25 PPM PCBS WOULD OCCUR AT EACH AFFECTED LOCATION.

AS FORMULATED FOR THIS ALTERNATIVE, GROUNDWATER WOULD BE COLLECTED TO THE EXTENT POSSIBLE BY USE OF RECOVERY WELLS. RECOVERY WELLS WOULD BE INSTALLED DOWNGRADIENT OF THE SITES. BY PUMPING EACH WELL, AN EFFORT WOULD BE MADE TO CREATE A HYDRAULIC BARRIER.

WHERE PUMPING OF INDIVIDUAL RECOVERY WELLS IS SUCCESSFUL IN REMOVING AFFECTED GROUNDWATER, IT ACCELERATES THE NATURAL FLUSHING OF WASTE CONSTITUENTS SORBED ON THE SOIL IN THE AQUIFER BY INCREASING THE FLOW RATE OF RELATIVELY CLEAN WATER FROM AREAS UPGRADIENT OF THE CONSTITUENT SOURCE THROUGH THE AFFECTED AREAS.

SANGAMO PLANT SITE

GROUNDWATER AT THE SANGAMO PLANT SITE OCCURS PRIMARILY WITHIN THE JOINT AND FRACTURE SYSTEM OF THE BEDROCK. GROUNDWATER FLOW WITHIN THE BEDROCK AT THE SANGAMO PLANT SITE IS LIMITED BY THE SIZE, ORIENTATION, AND INTERCONNECTION OF OPEN JOINTS AND FRACTURES. THESE WELLS MAY NOT REMOVE CONSTITUENTS THAT ARE HEAVIER THAN WATER. GROUNDWATER DISCHARGE

FROM WELLS SURROUNDING THE RIDGE WOULD CONTAIN PRIMARILY VOCS. THIS WATER WOULD BE TREATED BY AIR STRIPPING. GROUNDWATER DOWNGRADIENT OF AREAS A, B, E, AND THE WASTE WATER TREATMENT FACILITY WOULD BE TREATED BY CARBON ADSORPTION. IN THIS AREA, RI DATA SHOWED PCBS IN GROUNDWATER COLLECTED FROM 10 OF 17 WELLS. VOCS HAVE BEEN DETECTED IN A MAJORITY OF THESE WELLS. TREATED WATER WOULD BE DISCHARGED INTO TOWN CREEK.

BREAZEALE SITE

THE ASSUMED PUMPING SCHEME FOR THE BREAZEALE SITE CONSISTS OF GROUNDWATER EXTRACTION WELLS SCREENED IN THE SATURATED PORTIONS OF THE SAPROLITE AND FLOODPLAIN DEPOSITS.

GROUNDWATER DISCHARGE WOULD CONTAIN VOCS AND WOULD BE TREATED THROUGH AIR STRIPPING. TREATED WATER WOULD BE DISCHARGED INTO WOLF CREEK.

DODGENS SITE

THE ASSUMED PUMPING SCHEME FOR THE DODGENS SITE CONSISTS OF GROUNDWATER EXTRACTION WELLS SCREENED IN THE SATURATED PORTIONS OF THE SAPROLITE.

GROUNDWATER DISCHARGE MAY CONTAIN VOCS AND ONE SEMI-VOLATILE. COLLECTED GROUNDWATER WOULD BE TREATED THROUGH AIR STRIPPING AND CARBON ADSORPTION, IF NECESSARY. TREATED WATER WOULD BE DISCHARGED TO MIDDLE FORK TWELVEMILE CREEK.

7.7.2 EFFECTIVENESS

THE EFFECTIVENESS PROVIDED BY THIS ALTERNATIVE IS RELATED TO THREE CRITERIA:

* THE EXTENT TO WHICH THE GROUNDWATER COLLECTION SYSTEM IS CAPABLE OF PREVENTING MOVEMENT OF AFFECTED GROUNDWATER FROM THE PLANT, BREAZEALE, CROSS ROADS AND DODGENS SITES,

* THE GRADUAL REDUCTION IN THE TOXICITY OF GROUNDWATER BY TREATMENT,

* REDUCTION OF VOLUME OF THE AFFECTED MATERIAL, AND

* PROPER DESIGN, CONSTRUCTION, AND MAINTENANCE OF THE LAND DISPOSAL UNIT.

THE SHORT-TERM EFFECTIVENESS PROVIDED DURING CONSTRUCTION OF THIS ALTERNATIVE FOR GROUNDWATER COLLECTION AND ON-SITE DISPOSAL OF SOLID MATERIALS WOULD BE PROVIDED BY CONSTRUCTION TECHNIQUES AND WELL INSTALLATION METHODS THAT REDUCE THE MIGRATION OF WASTE CONSTITUENTS. THE LARGE VOLUME OF MATERIAL TO BE MOVED DURING EXCAVATION WOULD RESULT IN A PERIOD DURING WHICH A POTENTIAL FOR EXPOSURE WOULD EXIST. USE OF MEASURES FOR THE PREVENTION OF RUN-OFF AND THE CONTROL OF DUST WOULD

PROVIDE A MEASURE OF PROTECTION TO HUMAN HEALTH AND THE ENVIRONMENT DURING CONSTRUCTION. THE SOLID MATERIALS WOULD NOT BE REDUCED IN EITHER TOXICITY OR VOLUME BY THE IMPLEMENTATION OF THIS ALTERNATIVE.

THE ON-SITE LAND DISPOSAL COMPONENT OF THIS ALTERNATIVE WOULD BE EFFECTIVE IN PROTECTING HUMAN HEALTH AND THE ENVIRONMENT FROM EXPOSURE TO WASTE CONSTITUENTS NEAR THE LAND DISPOSAL UNIT. EFFECTIVENESS WOULD BE MAINTAINED BY USE OF A PROGRAM THAT INCLUDES CAP AND COVER CARE AT THE LANDFILL, GROUNDWATER MONITORING, AND LEACHATE TREATMENT.

7.8 ALTERNATIVE 8: LIMITED GROUNDWATER ACTION WITH ON-SITE TREATMENT AND DISPOSAL OF SOLIDS

7.8.1 DESCRIPTION

THIS ALTERNATIVE CONSISTS OF LIMITED ACTION ON GROUNDWATER, AS DESCRIBED IN SECTION 7.2.1, COUPLED WITH THE EXCAVATION OF SOLID MATERIALS AND TREATMENT OF THE MATERIALS IN AN ON-SITE TREATMENT SYSTEM. FOR SCREENING PURPOSES, FOUR TREATMENT TECHNOLOGIES WERE CONSIDERED: THERMAL DESTRUCTION, THERMAL SEPARATION, CHEMICAL DECHLORINATION, AND STABILIZATION.

EACH OF THE FOLLOWING REPRESENTATIVE PROCESS OPTIONS HAS BEEN SELECTED BASED ON COMMERCIAL AVAILABILITY AND/OR HISTORY OF PRIOR FULL-SCALE APPLICATION:

OPTION 8A:	THERMAL DESTRUCTION - ROTARY KILN INCINERATION
OPTION 8B:	THERMAL SEPARATION - LOW TEMPERATURE THERMAL STRIPPING
OPTION 8C:	CHEMICAL DECHLORINATION - GLYCOLATE DECHLORINATION
OPTION 8D:	PHYSICAL STABILIZATION SOLIDIFICATION/FIXATION

THE FIRST STEP IN THIS ALTERNATIVE WOULD INCLUDE EXCAVATION OF SOLID MATERIALS AFFECTED WITH GREATER THAN 1 PPM, 10 PPM, OR 25 PPM PCBS AS APPROPRIATE. FOLLOWING EXCAVATION, THE MATERIALS WOULD BE TEMPORARILY STOCKPILED ON THE PLANT SITE. THIS MATERIAL CONSISTS OF 2,900 CUBIC YARDS OF SOLID WASTE AND 48,200 CUBIC YARDS OF SOILS AND SEDIMENTS. SEDIMENTS WOULD BE DREDGED AND DEWATERED PRIOR TO TRANSPORT TO THE TREATMENT AREA. LIQUIDS PRODUCED DURING DEWATERING WOULD BE TEMPORARILY STORED IN TANKS AND THEN TRANSPORTED FOR TREATMENT IN THE LEACHATE TREATMENT UNIT AT THE ON-SITE TSCA LANDFILL. THE AVERAGE HAUL DISTANCE FROM ON-SITE EXCAVATION AREAS SITE WOULD BE LESS THAN APPROXIMATELY ONE-HALF MILE. THE AVERAGE HAUL DISTANCE FROM REMOTE SITE EXCAVATION AREAS WOULD BE APPROXIMATELY 2.5 MILES. THE VOLUME OF THE TREATMENT RESIDUALS WOULD BE DETERMINED DURING A TREATABILITY STUDY. LIMITED FIELD TRIALS MAY BE REQUIRED TO CONFIRM TREATMENT EFFECTIVENESS AND TO CHARACTERIZE TREATMENT RESIDUALS.

EACH OF THE TREATMENT PROCESS OPTIONS WOULD REQUIRE PRE-PROCESSING OF THE SOLIDS TO REMOVE OVERSIZED ITEMS AND TO REDUCE THE PARTICLE SIZE.

THE COST AND ANALYSIS OF THIS ALTERNATIVE IS BASED IN PART ON THE ASSUMPTION THAT A PORTION OF THE TOTAL MASS OF SOLIDS WOULD BE REJECTED DURING PREPROCESSING. THE ASSUMPTION OF A ONE PERCENT REJECTION RATE IS USED BECAUSE MUCH OF THE AFFECTED AREAS ARE NOT COVERED WITH THICK STANDS OF TREES.

THESE MATERIALS WOULD REQUIRE OFF-SITE DISPOSAL AND/OR TREATMENT AS A TSCA REGULATED WASTE IN A PERMITTED LANDFILL.

UNDER ALL FOUR TREATMENT OPTIONS, EXCAVATED AREAS WOULD BE BACKFILLED WITH NATIVE SOIL, GRADED, AND RESTORED TO SUPPORT VEGETATION. A LONG-TERM GROUNDWATER MONITORING PROGRAM WOULD BE IMPLEMENTED, AS DESCRIBED IN ALTERNATIVE 1.

OPTION 8A: THERMAL DESTRUCTION

THIS OPTION INCLUDES USE OF A TRANSPORTABLE ROTARY KILN INCINERATOR THAT WOULD BE LOCATED AT THE SITE BY A COMMERCIAL VENDOR. THE UNIT WOULD MEET THE SUBSTANTIVE REQUIREMENTS OF ALL APPLICABLE PERMITS.

THE SYSTEM WOULD CONSIST OF THE FOLLOWING TYPICAL UNIT OPERATIONS:

* MATERIAL PREPROCESSING/SORTING
* ROTARY KILN INCINERATOR
* ASH HANDLING/STORAGE
* SECONDARY COMBUSTION OF OFF-GASES
* BAGHOUSE DUST COLLECTION
* WET SCRUBBER
* SCRUBBER WATER TREATMENT

START-UP TESTS REQUIRED PRIOR TO FULL-SCALE OPERATION MAY REQUIRE FROM SIX MONTHS TO ONE AND ONE-HALF YEARS.

TREATED SCRUBBER WATER COULD BE TEMPORARILY STORED IN A TANK AND TRANSPORTED TO THE LEACHATE TREATMENT SYSTEM LOCATED AT THE ON-SITE DISPOSAL UNIT. COMPLETE SYSTEM DETAILS WOULD BE DEVELOPED AS A REMEDIAL DESIGN TASK.

OPTION 8B: THERMAL SEPARATION

THERMAL SEPARATION IS A PROCESS OPTION RETAINED FROM THE SCREENING OF THERMAL TREATMENT TECHNOLOGIES.

THERMAL SEPARATION IS A PROCESS IN WHICH SOILS OR SLUDGES WITH ORGANIC COMPOUNDS ARE HEATED IN A ROTARY DRYER. VOLATILIZED ORGANICS ARE TRANSFERRED, USING NITROGEN AS THE CARRIER GAS, AND COOLED TO CONDENSE ORGANIC COMPONENTS. THE CONDENSED COMPONENTS ARE THEN COLLECTED FOR FURTHER TREATMENT AT AN APPROPRIATE FACILITY.

THE PERMIT REQUIREMENTS FOR THIS SYSTEM ARE STILL BEING DETERMINED BY

THE OWNER OF THE EQUIPMENT. HOWEVER, AS A "PROCESSING," RATHER THAN A "DESTRUCTION" METHOD, ATTAINMENT OF THE SUBSTANTIVE REQUIREMENTS OF RCRA OR TSCA PERMITS MAY NOT BE REQUIRED. THIS SYSTEM WOULD CONSIST OF THE FOLLOWING TYPICAL UNIT OPERATIONS:

* MATERIAL PREPROCESSING/SORTING
* ROTARY DRYER THERMAL SEPARATION
* CARBON ADSORPTION UNIT (OR COMBUSTION AFTERBURNER)
* COOLING AND CONDENSATE TRAIN
* OFF-GAS HANDLING TRAILER
* RESIDUALS MANAGEMENT UNIT

ON THE BASIS OF PILOT STUDIES, A TREATMENT CAPACITY OF FIVE TONS PER HOUR CAN BE EXPECTED. ASSUMING A TYPICAL DENSITY OF APPROXIMATELY 1.3 TONS PER CUBIC YARD OF MATERIAL, THE ESTIMATED TIME EXPECTED TO COMPLETE

TREATMENT WOULD BE APPROXIMATELY TWO YEARS. THIS ESTIMATE IS BASED ON THE USE OF ONE TREATMENT SYSTEM AND 30 PERCENT DOWNTIME.

OPTION 8C: CHEMICAL DECHLORINATION

THE PROPRIETARY KPEG PROCESS IS USED TO REPRESENT CHEMICAL TREATMENT TECHNOLOGIES APPROPRIATE FOR USE IN TREATING SOILS CONTAINING PCBS AND OTHER SOLIDS. SINCE THE KPEG PROCESS OPERATES UNDER HIGHLY ALKALINE CONDITIONS, ALUMINUM SLUDGE AND POSSIBLY OTHER METALS THAT REACT UNDER THESE CONDITIONS MAY INCREASE THE AMOUNT OF REAGENT REQUIRED BY COMPETING FOR THE KPEG: THEREFORE, THIS PROCESS OPTION IS NOT CONSIDERED APPLICABLE FOR TREATMENT OF SLUDGES. CHEMICAL TREATMENT DIRECTED TOWARD PCBS MAY PROVIDE COINCIDENTAL TREATMENT OF OTHER CHLORINATED VOLATILE ORGANICS.

THE CHEMICAL TREATMENT SYSTEM WOULD CONSIST OF THE FOLLOWING TYPICAL OPERATIONS:

* MATERIAL PREPROCESSING/SORTING
* REAGENT STORAGE
* SOLIDS MIXING
* SOLIDS REACTION
* DECANT AND SOLIDS WASHING
* REAGENT RECYCLING AND CONDENSATION

PROCESS WASTEWATERS WOULD BE TEMPORARILY STORED IN TANKS AND LATER TRANSPORTED TO THE LEACHATE TREATMENT SYSTEM.

THE PRESENT ESTIMATE BY GALSON RESEARCH CORPORATION (PATENT-HOLDER) OF THE ACHIEVABLE TREATMENT RATE USING KPEG IS 250 YD3/D. CONTINUOUS (24 HR/D) PROCESSING OF THE ENTIRE VOLUME WOULD REQUIRE OVER ONE YEAR. THE ESTIMATE ASSUMES A MINIMUM OF 30 PERCENT DOWNTIME FOR THE PROCESS.

OPTION 8D: PHYSICAL STABILIZATION

PHYSICAL STABILIZATION, OR SOLIDIFICATION/FIXATION WAS CONSIDERED FOR USE AS A TREATMENT PROCESS FOR SOIL AND SLUDGE. THIS TREATMENT WOULD REDUCE THE MOBILITY OF WASTE CONSTITUENTS BY BINDING THE SOIL OR SLUDGE MASS INTO SOLID MATRIX WITH LOW PERMEABILITY THAT RESISTS LEACHING. THIS ALTERNATIVE WOULD INCREASE THE VOLUME OF AFFECTED MATERIAL.

THE TREATMENT SYSTEM WOULD CONSIST OF THE FOLLOWING TYPICAL UNIT OPERATIONS:

* MATERIAL PREPROCESSING/SORTING
* SETTING AGENT STORAGE
* PUGMILL MIXING

THE EQUIPMENT REQUIRED FOR SOLIDIFICATION/FIXATION WOULD BE SIMILAR TO THAT USED FOR CEMENT MIXING. THE TREATED MATERIAL WOULD BE TRANSPORTED

TO THE ON-SITE DISPOSAL UNIT FOR CURING AND DISPOSAL.

SINCE THE PROCESSES USED IN SOLIDIFICATION/FIXATION ARE LOGISTICALLY SIMILAR TO THOSE OF CEMENT MIXING, THE TIME REQUIRED TO TREAT THE SOIL AND SLUDGE WOULD NOT VARY SIGNIFICANTLY FROM THAT REQUIRED FOR EXCAVATION.

7.8.2 EFFECTIVENESS

THE SHORT-TERM PROTECTIVENESS PROVIDED DURING EXCAVATION AND TREATMENT OF ALL SOLIDS CONTAINING MORE THAN 25 PPM PCBS WOULD BE ACCOMPLISHED BY USE OF CONSTRUCTION METHODS THAT MINIMIZE TRANSPORT. TEMPORARY BERMS AND RUN-OFF CONTROL DITCHES WOULD BE USED TO CONTROL TRANSPORT OF AFFECTED SOILS.

LONG-TERM PROTECTION WOULD BE ACCOMPLISHED BY REMOVAL AND DESTRUCTION OF WASTE CONSTITUENTS. TOXICITY, MOBILITY, AND VOLUME OF HAZARDOUS MATERIALS WOULD BE REDUCED BY TREATMENT. ANY POTENTIAL LONG-TERM SURFACE MIGRATION BY THE LOW CONCENTRATIONS OF WASTE CONSTITUENTS THAT REMAIN IN PLACE WOULD BE LIMITED BY PLACEMENT OF CLEAN BACKFILL.

GROUNDWATER QUALITY WOULD BE MONITORED BY THE SAMPLING AND ANALYSIS PROGRAM PROPOSED AS PART OF THE LIMITED ACTION RESPONSE.

FOUR TREATMENT PROCESSES ARE UNDER CONSIDERATION AS PART OF THIS ALTERNATIVE: ROTARY KILN INCINERATION, THERMAL SEPARATION, GLYCOLATE DECHLORINATION, AND STABILIZATION/FIXATION. EACH PROCESS HAS BEEN SHOWN TO BE EFFECTIVE IN REDUCTION OF AT LEAST ONE OF THREE WASTE CHARACTERISTICS: TOXICITY, MOBILITY OR VOLUME FOR ONE OR MORE OF THE CONSTITUENTS OF CONCERN. THE COMBINATION OF TREATMENT WITH DISPOSAL OF RESIDUALS IN AN ON-SITE SECURE LANDFILL WOULD PROVIDE AN EFFECTIVE MEANS OF REDUCING TOXICITY, MOBILITY, AND VOLUME OF WASTE CONSTITUENTS.

OPTION 8A: THERMAL DESTRUCTION (ROTARY KILN)

THE EFFECTIVENESS OF INCINERATION AS A TREATMENT PROCESS FOR ORGANIC COMPOUNDS HAS BEEN DEMONSTRATED AT NUMEROUS SITES. THIS TREATMENT PROCESS WOULD AFFECT ALL THREE OF THE CHARACTERISTICS FOR PCBS AND HALOGENATED AND NONHALOGENATED VOLATILES. IT WOULD NOT AFFECT ANY OF THE THREE CHARACTERISTICS FOR AFFECTED MATERIALS CONTAINING METALS.

OPTION 8B: THERMAL SEPARATION

THERMAL SEPARATION HAS BEEN SHOWN TO HAVE A REMOVAL EFFICIENCY OF GT 99.95 PERCENT FOR PCBS. ITS EFFECTIVENESS FOR TREATMENT OF VOLATILE ORGANIC COMPOUNDS HAS ALSO BEEN DEMONSTRATED.

IF RESULTS OF CURRENT TESTS USING THIS PROCESS INDICATE APPLICABILITY AT THIS SITE, A TREATABILITY STUDY WOULD BE PERFORMED ON SAMPLES OF SOIL AND SLUDGE TAKEN FROM THE SANGAMO PLANT AS PART OF THE REMEDIAL DESIGN

PHASE OF SITE REMEDIATION.

OPTION 8C: GLYCOLATE DECHLORINATION (KPEG)

KPEG, WHILE NOT SPECIFICALLY DESIGNED FOR THE TREATMENT OF ORGANICS OTHER THAN PCBS, MAY PROVIDE FURTHER PROTECTION BY REMOVING VOLATILE ORGANIC COMPOUNDS DURING REACTION OR SOIL-WASHING PHASES. IT HAS BEEN USED AT FULL SCALE FOR TREATMENT OF PCBS IN SOIL, BUT IT HAS NOT BEEN USED ROUTINELY FOR TREATMENT OF WASTE CONSTITUENTS LIKE THOSE FOUND AT THE PLANT SITE. THE KPEG PROCESS WOULD NOT AFFECT THE CHARACTERISTICS OF METALS IN SOIL. A TREATABILITY STUDY WILL BE CONDUCTED TO EVALUATE ITS OVERALL EFFECTIVENESS ON THE WASTE CONSTITUENTS PRESENT AT THE SITE.

TREATED RESIDUALS FROM EACH OF THE THREE PRECEDING PROCESS OPTIONS WOULD BE ANALYZED FOR THE PRESENCE OF METALS. RESULTS OF THE RI INDICATE THAT CONCENTRATION OF METALS WILL NOT EXCEED PERMISSIBLE LIMITS FOR LAND DISPOSAL.

OPTION 8D: PHYSICAL STABILIZATION

THIS PROCESS, USED IN THE TREATMENT OF INORGANIC COMPOUNDS, HAS A WELL DOCUMENTED HISTORY OF SUCCESSFULLY IMMOBILIZING WASTE CONSTITUENTS. A LIMIT TO THE EFFECTIVENESS OF THIS PROCESS IS THE QUANTITY OF OIL AND GREASE PRESENT IN AFFECTED MEDIA. THE CONCENTRATIONS OF OIL AND GREASE ARE MORE SIGNIFICANT IN DETERMINING THE APPLICABILITY OF STABILIZATION THAN THE PCB CONCENTRATIONS IN THE AFFECTED MEDIA. A TREATABILITY STUDY WOULD HAVE TO BE PERFORMED TO DETERMINE THE EFFECTIVENESS OF THIS PROCESS ON THE CONCENTRATIONS OF WASTE CONSTITUENTS DETECTED AT THE SITE.

7.9 ALTERNATIVE 9: TREATMENT OF GROUNDWATER, LIMITED ACTION ON SOILS, IN SITU TREATMENT OF SOIL, OFF-SITE TREATMENT AND DISPOSAL OF SOLID WASTES, AND ON-SITE TREATMENT AND DISPOSAL OF SLUDGE

7.9.1 DESCRIPTION

SEVERAL DIFFERENT COMPONENTS MAKE UP THIS ALTERNATIVE AND ARE DISCUSSED IN THIS SECTION. THE GROUNDWATER COLLECTION TECHNIQUE FOR THIS ALTERNATIVE IS DISCUSSED IN SECTION 7.7.1.

REMEDIATION OF THE 48,200 CUBIC YARDS OF AFFECTED SOIL WOULD BE THROUGH IN-SITU BIODEGRADATION. THIS PROCESS OPTION, COUPLED WITH GROUNDWATER COLLECTION, CAN PROVIDE SUBSTANTIAL REDUCTION IN CONCENTRATIONS OF ORGANIC COMPOUNDS INTO WATER AND CARBON DIOXIDE IN THE PRESENCE OF SUFFICIENT OXYGEN AND NUTRIENTS AND PHOSPHOROUS.

TYPICAL UNIT PROCESSES THAT WOULD BE REQUIRED FOR THIS ELEMENT FOLLOW:

* BIOLOGICAL INOCULUM FERMENTER
* NUTRIENT FEED SYSTEM

* OXYGENATION SYSTEM
* CHEMICAL/BIOLOGICAL ADDITIVE CONTROL AND FEED SYSTEM

SITE SPECIFIC PILOT TESTS WOULD BE REQUIRED TO ESTIMATE A TIME OF COMPLETION FOR REMEDIATION.

TREATMENT OF AFFECTED SLUDGE WHICH CONSISTS OF 23,000 CUBIC YARDS, WOULD BE PERFORMED ON-SITE WITH ONE OF THE FOLLOWING PROCESSES: THERMAL DESTRUCTION, THERMAL SEPARATION, GLYCOLATE DECHLORINATION, OR PHYSICAL STABILIZATION. HOWEVER, IF TREATABILITY DATA SO INDICATES, BIOREMEDIATION OF SLUDGE MAY BE APPROPRIATE. THE DESCRIPTIONS FOR THE FIRST FOUR OPTIONS ARE DISCUSSED IN SECTION 7.8.1. THE TREATMENT RESIDUALS WOULD REMAIN ON-SITE FOR DISPOSAL IN A SECURE TSCA LANDFILL. THE VOLUME OF THE TREATMENT RESIDUALS WOULD BE DETERMINED DURING THE TREATABILITY STUDY.

IN THIS ALTERNATIVE, SOLID WASTES WOULD BE EXCAVATED THEN TREATED AND DISPOSED OF OFF-SITE IN A TSCA LANDFILL. IF THERMAL DESTRUCTION IS THE OPTION SELECTED FOR SLUDGE TREATMENT, SOLID WASTES WOULD BE TREATED ON-SITE; OTHERWISE, THE 2,900 CUBIC YARDS OF SOLID WASTES WOULD BE SHIPPED OFF-SITE FOR THERMAL DESTRUCTION. THIS RESPONSE ACTION IS DISCUSSED IN SECTION 7.8.1.

7.9.2 EFFECTIVENESS

THE SHORT-TERM PROTECTION PROVIDED DURING EXCAVATION AND TREATMENT OF ALL SLUDGES AND SOLID WASTES CONTAINING GREATER THAN 25 PPM PCBS WOULD BE SIMILAR TO THAT DISCUSSED IN SECTION 7.4.2. HOWEVER, IMPLEMENTATION OF THIS ALTERNATIVE WOULD REQUIRE A GREATER VOLUME OF MATERIAL TO BE EXCAVATED THAN THAT INCLUDED IN ALTERNATIVE 4. TEMPORARY BERMS AND RUN-OFF CONTROL DITCHES WOULD BE USED TO CONTROL TRANSPORT OF AFFECTED SOLIDS AT GROUND SURFACE.

LONG-TERM PROTECTION WOULD BE ACCOMPLISHED BY REMOVAL AND DESTRUCTION OF SLUDGES AND SOLID WASTES. THE TOXICITY, MOBILITY, AND VOLUME OF THESE

MEDIA WOULD BE REDUCED BY TREATMENT.

THE LONG-TERM EFFECTIVENESS OF THE GROUNDWATER REMEDIATION SYSTEM IS UNKNOWN.

THE LONG-TERM EFFECTIVENESS OF BIODEGRADATION IS POOR IN AREAS WHERE AFFECTED SOILS LIE ABOVE GROUNDWATER. HOWEVER, LIMITED ACTIONS IN THOSE AREAS WOULD SUPPLEMENT BIOREMEDIATION AND INCREASE THE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT FROM EXPOSURE TO WASTE CONSTITUENTS. THE EFFECTIVENESS WOULD BE MAINTAINED BY USE OF A PROGRAM INCLUDING INSTITUTIONAL CONTROLS, SURFACE CARE IN BIOREMEDIATION AREAS, AND GROUNDWATER MONITORING.

THE ON-SITE LAND DISPOSAL COMPONENT OF THIS ALTERNATIVE WOULD BE EFFECTIVE IN PROTECTING HUMAN HEALTH AND THE ENVIRONMENT FROM EXPOSURE

TO WASTE CONSTITUENTS IN THE VICINITY OF THE LAND DISPOSAL UNIT. THE EFFECTIVENESS WOULD BE MAINTAINED BY USE OF A PROGRAM INCLUDING SURFACE CARE AT THE LANDFILL, GROUNDWATER MONITORING, AND LEACHATE TREATMENT.

7.10 ALTERNATIVE 10: LIMITED GROUNDWATER ACTION WITH ON-SITE TREATMENT AND OFF-SITE DISPOSAL OF SOLIDS

7.10.1 DESCRIPTION

THE COMPONENTS OF THIS ALTERNATIVE ARE DISCUSSED AS FOLLOWS:

1. GROUNDWATER COMPONENT - LIMITED ACTION, SECTION 7.2.1.

2. EXCAVATION AND TREATMENT OF SOIL, SLUDGE, AND SOLID WASTES - LIMITED GROUNDWATER ACTION WITH ON-SITE TREATMENT AND OFF-SITE DISPOSAL OF SOLIDS, SECTION 7.8.1.

THE COMPONENT THAT MAKES THIS ALTERNATIVE DIFFERENT FROM ALTERNATIVE 8 IS OFF-SITE DISPOSAL OF TREATMENT RESIDUALS.

7.10.2 EFFECTIVENESS

THE SHORT-TERM PROTECTION PROVIDED DURING EXCAVATION AND TREATMENT OF ALL SOLIDS CONTAINING GREATER THAN 25 PPM PCBS WOULD BE PROVIDED BY USE OF CONSTRUCTION METHODS THAT MINIMIZE TRANSPORT OF AFFECTED MATERIALS. TEMPORARY BERMS AND RUN-OFF CONTROL DITCHES WOULD BE USED TO CONTROL TRANSPORT OF AFFECTED SOLIDS AT GROUND SURFACE.

LONG-TERM PROTECTION WOULD BE ACCOMPLISHED BY REMOVAL AND DESTRUCTION OF WASTE CONSTITUENTS. THE TOXICITY, MOBILITY, AND VOLUME OF AFFECTED MATERIALS WOULD BE REDUCED BY TREATMENT. ANY POTENTIAL LONG-TERM MIGRATION AT GROUND SURFACE BY THE LOW CONCENTRATIONS OF WASTE CONSTITUENTS THAT REMAIN IN PLACE WOULD BE LIMITED BY PLACEMENT OF CLEAN BACKFILL.

GROUNDWATER QUALITY WOULD BE MONITORED BY THE SAMPLING AND ANALYSES PROPOSED AS PART OF THE NO ACTION RESPONSE DESCRIBED IN SECTION 7.1.

THE TREATMENT PROCESSES UNDER CONSIDERATION AS PART OF THIS ALTERNATIVE HAVE BEEN SHOWN TO BE EFFECTIVE IN REDUCING AT LEAST ONE OF THREE WASTE CHARACTERISTICS: TOXICITY, MOBILITY OR VOLUME FOR ONE OR MORE OF THE CONSTITUENTS OF CONCERN. THESE TREATMENT PROCESSES ARE DISCUSSED IN ALTERNATIVE 8. THE COMBINATION OF TREATMENT WITH DISPOSAL OF RESIDUALS IN AN OFF-SITE SECURE TSCA LANDFILL WOULD PROVIDE AN EFFECTIVE MEANS OF REDUCING TOXICITY, MOBILITY, AND VOLUME OF WASTE CONSTITUENTS.

7.11 ALTERNATIVE 11: TREATMENT OF GROUNDWATER WITH ON-SITE TREATMENT AND ON-SITE DISPOSAL OF SOLIDS

7.11.1 DESCRIPTION

THE COMPONENTS THAT MAKE UP THIS ALTERNATIVE ARE IDENTICAL TO THOSE OF ALTERNATIVE 8 WITH ONE EXCEPTION: IN THIS ALTERNATIVE, GROUNDWATER WOULD BE REMEDIATED BY COLLECTION, TREATMENT AND DISPOSAL. THIS ACTION FOR GROUNDWATER IS DESCRIBED IN SECTION 7.7.1.

7.11.2 EFFECTIVENESS

THE SHORT-TERM PROTECTION PROVIDED DURING EXCAVATION AND TREATMENT OF ALL SOLIDS CONTAINING GREATER THAN 25 PPM PCBS WOULD BE ACCOMPLISHED BY USE OF CONSTRUCTION METHODS THAT MINIMIZE TRANSPORT OF AFFECTED MATERIALS. THE LARGE VOLUME OF MATERIAL TO BE MOVED DURING EXCAVATION WOULD RESULT IN A PERIOD DURING WHICH A POTENTIAL FOR EXPOSURE WOULD EXIST. TEMPORARY BERMS AND RUN-OFF CONTROL DITCHES WOULD BE USED TO CONTROL TRANSPORT OF AFFECTED SOLIDS AT GROUND SURFACE.

LONG-TERM PROTECTION WOULD BE ACCOMPLISHED BY REMOVAL AND DESTRUCTION OF WASTE CONSTITUENTS. THE TOXICITY, MOBILITY, AND VOLUME OF HAZARDOUS MATERIALS WOULD BE REDUCED BY TREATMENT.

ANY POTENTIAL LONG-TERM MIGRATION AT GROUND SURFACE BY THE LOW CONCENTRATIONS OF WASTE CONSTITUENTS THAT REMAIN IN PLACE WOULD BE LIMITED BY PLACEMENT OF CLEAN BACKFILL.

THE TREATMENT PROCESSES UNDER CONSIDERATION AS PART OF THIS ALTERNATIVE INCLUDING INCINERATION, THERMAL SEPARATION, GLYCOLATE DECHLORINATION, AND STABILIZATION/FIXATION, HAVE BEEN SHOWN TO BE EFFECTIVE IN REDUCTION OF AT LEAST ONE OF THREE WASTE CHARACTERISTICS: TOXICITY, MOBILITY, OR VOLUME FOR ONE OR MORE OF THE CONSTITUENTS OF CONCERN. THESE TREATMENT PROCESSES ARE DISCUSSED IN ALTERNATIVE 8. THE COMBINATION OF TREATMENT WITH DISPOSAL OF RESIDUALS IN AN ON-SITE SECURE LANDFILL WOULD PROVIDE AN EFFECTIVE MEANS OF REDUCING TOXICITY, MOBILITY, AND VOLUME OF WASTE CONSTITUENTS.

THE ON-SITE LAND DISPOSAL COMPONENT OF THIS ALTERNATIVE WOULD BE

EFFECTIVE IN PROTECTING HUMAN HEALTH AND THE ENVIRONMENT FROM EXPOSURE TO WASTE CONSTITUENTS IN THE VICINITY OF THE LAND DISPOSAL UNIT. THE EFFECTIVENESS WOULD BE MAINTAINED BY USE OF A PROGRAM INCLUDING SURFACE CARE AT THE LANDFILL, GROUNDWATER MONITORING, AND LEACHATE TREATMENT.

7.12 ALTERNATIVE 12: TREATMENT OF GROUNDWATER WITH ON-SITE TREATMENT AND OFF-SITE DISPOSAL OF SOLIDS

7.12.1 DESCRIPTION

THE COMPONENTS THAT COMPRISE THIS ALTERNATIVE ARE THE SAME AS THOSE THAT MAKE UP ALTERNATIVE 10, WITH ONE EXCEPTION: THIS ALTERNATIVE INCLUDES COLLECTION, TREATMENT, AND DISCHARGE OF GROUNDWATER. THE ELEMENTS THAT WOULD BE USED TO EXCAVATE AND TREAT SOLID MATERIALS ARE DESCRIBED IN SECTION 7.8.1. THE ELEMENTS THAT WOULD BE USED TO TRANSPORT AND DISPOSE

THE MATERIALS ARE DESCRIBED IN SECTION 7.6.1.

7.12.2 EFFECTIVENESS

THE SHORT-TERM PROTECTION PROVIDED DURING EXCAVATION AND TREATMENT OF ALL SOLIDS CONTAINING GREATER THAN 25 PPM PCBS WOULD BE ACCOMPLISHED BY USE OF CONSTRUCTION METHODS THAT MINIMIZE TRANSPORT OF AFFECTED MATERIALS. EXCAVATION OF ALL SOLIDS WOULD RESULT IN A PERIOD DURING WHICH THE RISK OF EXPOSURE WOULD BE INCREASED. TEMPORARY BERMS AND RUN-OFF CONTROL DITCHES WOULD BE USED TO CONTROL TRANSPORT OF AFFECTED SOLIDS AT THE GROUND SURFACE. ANY WASTES HAULED OFF-SITE COULD POTENTIALLY EXPOSE THOSE PERSONS USING THE SAME ROADS, OR LIVING OR WORKING ALONG THE ROUTE, TO AFFECTED TREATMENT RESIDUALS.

LONG-TERM PROTECTION WOULD BE ACCOMPLISHED BY REMOVAL AND DESTRUCTION OF WASTE CONSTITUENTS. THE TOXICITY, MOBILITY, AND VOLUME OF WASTE MATERIALS WOULD BE REDUCED BY TREATMENT. ANY POTENTIAL LONG-TERM MIGRATION AT GROUND SURFACE BY THE LOW CONCENTRATIONS OF WASTE CONSTITUENTS THAT REMAIN IN PLACE WOULD BE LIMITED BY PLACEMENT OF CLEAN BACKFILL AND MONITORED BY THE SAMPLING AND ANALYSES PROPOSED AS PART OF THE LIMITED ACTION PLAN FOR SOLIDS.

THE TREATMENT PROCESSES UNDER CONSIDERATION AS PART OF THIS ALTERNATIVE, INCLUDING ROTARY KILN INCINERATION, THERMAL SEPARATION, GLYCOLATE DECHLORINATION, AND STABILIZATION/FIXATION HAVE BEEN SHOWN TO BE EFFECTIVE IN REDUCTION OF AT LEAST ONE OF THREE WASTE CHARACTERISTICS: TOXICITY, MOBILITY OR VOLUME FOR ONE OR MORE OF THE CONSTITUENTS OF CONCERN. THESE TREATMENT PROCESSES ARE DISCUSSED IN ALTERNATIVE 8. THE COMBINATION OF TREATMENT WITH DISPOSAL OF RESIDUALS IN AN OFF-SITE SECURE LANDFILL WOULD PROVIDE AN EFFECTIVE MEANS OF REDUCING TOXICITY, MOBILITY, AND VOLUME OF WASTE CONSTITUENTS.

ALTERNATIVE 13: CONSOLIDATED REMEDY/NO ACTION, LIMITED ACTION. EXCAVATION AND TREATMENT OF ACTIVE AND INACTIVE LAGOON SLUDGES

7.13.1 DESCRIPTION

THIS ALTERNATIVE INCLUDES REMEDIAL ACTION ELEMENTS PREVIOUSLY DISCUSSED IN THE DESCRIPTIONS OF OTHER ALTERNATIVES AND ADDRESSES EACH SECTION OF THE PLANT AND OFF-SITE AREAS WITH RESPECT TO THE SPECIFIC REMEDIAL REQUIREMENTS OF EACH LOCATION. WHILE A LARGER NUMBER OF TECHNOLOGY COMBINATIONS ARE POSSIBLE, THIS ALTERNATIVE OPTIMIZES THE USE OF MULTIPLE REMEDIAL ACTIONS WITHIN ONE CONSOLIDATED REMEDY.

PLANT SITE:

NO ACTION ON ALL MEDIA: DRAINFIELD (200 CUBIC YARDS OF SOIL).

LIMITED ACTION ON GROUNDWATER WITH CONTAINMENT OF SOLIDS:

PLANT AREAS A, B, C, E, F, G/H (15,500 CUBIC YARDS OF SOLID WASTE)

LIMITED ACTION ON GROUNDWATER WITH SLUDGE EXCAVATION (18,400 CUBIC YARDS), TREATMENT, AND ON-SITE DISPOSAL OF RESIDUALS:
WASTEWATER TREATMENT PLANT - STABILIZATION LAGOON (VOLUME OF TREATMENT RESIDUALS WOULD BE DETERMINED DURING THE TREATABILITY STUDY).

LIMITED ACTION ON GROUNDWATER WITH CONTAINMENT OF AFFECTED SOILS (9,700 CUBIC YARDS), AND SLUDGE EXCAVATION (3,800 CUBIC YARDS), TREATMENT, AND ON-SITE DISPOSAL OF WASTE:
WASTEWATER TREATMENT PLANT - INACTIVE LAGOON.

OFF-SITE AREAS

NO ACTION ON ALL MEDIA:
NIX AND WELBORN (1200 CUBIC YARDS OF SOLIDS).

LIMITED ACTION ON GROUNDWATER AND SOLIDS:
CROSSROADS (5,100 CUBIC YARDS OF SOLIDS).

LIMITED ACTION ON GROUNDWATER WITH CONTAINMENT OF SOLIDS:
BREAZEALE (5,500 CUBIC YARDS OF SOLIDS).

NO ACTION ON GROUNDWATER WITH CONTAINMENT OF SOLIDS:
DODGENS (2,000 CUBIC YARDS), AND JOHN TROTTER (700 CUBIC YARDS OF SOLIDS).

THE TECHNICAL COMPONENTS OF ALL THESE ELEMENTS WERE DISCUSSED IN THE DESCRIPTION SECTION OF PREVIOUSLY ANALYZED ALTERNATIVES.

7.13.2 EFFECTIVENESS

IN AREAS WHERE EITHER NO ACTION OR LIMITED ACTION ARE PROPOSED, THIS ALTERNATIVE WOULD NOT CHANGE THE CHARACTERISTICS OF THE WASTE AND AFFECTED MATERIAL. THEREFORE, TOXICITY, MOBILITY, AND VOLUME OF THE

MATERIAL WOULD BE REDUCED ONLY TO THE DEGREE PROVIDED BY NATURAL ATTENUATION. LAND USE RESTRICTIONS INSTITUTED AS PART OF LIMITED ACTION WOULD MITIGATE THE POTENTIAL RISK POSED BY DIRECT CONTACT WITH AFFECTED MATERIAL LEFT IN PLACE.

WHERE CONTAINMENT IS IMPLEMENTED, THE SHORT-TERM EFFECTIVENESS WOULD BE IMPROVED OVER THAT PROVIDED BY EXCAVATION. THE AFFECTED MATERIAL WOULD BE CAPPED WITH A RELATIVELY SMALL INCREASE IN INHALATION EXPOSURES BY WORKERS AND OFF-SITE POPULATIONS.

IN AREA D AT THE PLANT SITE, THE SHORT-TERM EXPOSURES FROM INSTALLING A VACUUM EXTRACTION SYSTEM WOULD BE NO GREATER THAN THAT ASSOCIATED WITH INSTALLATION OF GROUNDWATER MONITORING WELLS. THE LONG-TERM EFFECTS OF VACUUM EXTRACTION OF VOLATILE ORGANICS WOULD BE DECREASES IN MOBILITY OF WASTE CONSTITUENTS AND REDUCTION IN THE TOXICITY AND VOLUME OF THOSE

CONSTITUENTS IN THE SOIL PORE SPACE.

EXCAVATION, TREATMENT, AND ON-SITE DISPOSAL OF SLUDGE RESIDUALS WOULD CAUSE AN INCREASE IN THE EXPOSURE POTENTIAL OF WASTE CONSTITUENTS DURING CONSTRUCTION. THE LONG-TERM EFFECTS WOULD BE A DECREASE IN THE TOXICITY AND MOBILITY OF AFFECTED MATERIALS.

#SCAA
8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

GROUNDWATER ALTERNATIVES

ALTERNATIVES 7, 9, 11 AND 12 INCLUDE EXTRACTION AND TREATMENT OF CONTAMINATED GROUNDWATER AT THE PLANT SITE, DODGENS, BREAZEALE, AND CROSS ROADS SITES. THESE ALTERNATIVES WOULD PREVENT FURTHER MIGRATION OF THE CONTAMINANT PLUME AND WOULD, THEREFORE PROVIDE THE BEST OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. THE REMAINING SITES DID NOT APPEAR TO HAVE CONTAMINATION AT LEVELS ABOVE ACCEPTABLE LIMITS. INSTITUTIONAL CONTROLS (I.E. DEED RESTRICTIONS, ORDINANCES BANNING SHALLOW WELLS, FENCES, ETC.) WOULD PROVIDE LIMITED PROTECTION, BUT WOULD NOT PREVENT EVENTUAL CONTAMINATION OF SURFACE WATER AND FURTHER CONTAMINATION OF GROUNDWATER. THE NO ACTION ALTERNATIVE WOULD NOT PROVIDE ANY PROTECTION FOR HUMAN HEALTH OR THE ENVIRONMENT.

SOURCE CONTROL ALTERNATIVES

ALTERNATIVES 8, 10, 11, AND 12 INCLUDED FOUR TECHNOLOGIES FOR TREATMENT OF CONTAMINATED WASTE AND SOIL WERE EVALUATED IN THE FEASIBILITY STUDY. THESE WERE INCINERATION, LOW-TEMPERATURE THERMAL SEPARATION, GLYCOLATE DECHLORINATION AND SOLIDIFICATION. OF THESE TREATMENTS, THERMAL SEPARATION ON OR OFF-SITE APPEARS TO PROVIDE THE BEST OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. THERMAL SEPARATION USES AN

INDIRECT HEAT SOURCE TO REMOVE CONTAMINATION FROM THE SOIL, THEREBY CONDENSING IT INTO A MORE MANAGEABLE VOLUME. INCINERATION WOULD ALSO PROVIDE PROTECTION FOR HUMAN HEALTH AND THE ENVIRONMENT. GLYCOLATE DECHLORINATION HAS NOT BEEN DEMONSTRATED TO BE EFFECTIVE IN THE FIELD AND IT IS UNCERTAIN HOW PROTECTIVE THIS TREATMENT WOULD BE. SOLIDIFICATION OF THE MATERIALS WOULD BE INEFFECTIVE DUE TO THE PRESENCE OF OILS AND OTHER WASTES THAT WOULD INTERFERE WITH EFFECTIVE SOLIDIFICATION OF THE MATERIALS. OTHER ALTERNATIVES EVALUATED CONTAINMENT OR OFF-SITE DISPOSAL OF CONTAMINATED MATERIALS. IT IS UNLIKELY THESE WOULD PROVIDE ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT OVER THE LONG TERM. CAPS DEGRADE AND LANDFILLS ARE SUBJECT TO DEGRADATION-AND/OR LEACHATE PRODUCTION THAT COULD CREATE NEW PROBLEMS.

COMPLIANCE WITH ARARS

ARARS FOR TREATING OR MANAGING PCB-CONTAMINATED MATERIAL DERIVE PRIMARILY FROM TWO SETS OF REGULATIONS: THE TOXIC SUBSTANCES CONTROL ACT (TSCA) PCB REGULATIONS AND THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) LAND DISPOSAL RESTRICTIONS (LDRS). WHERE PCBS AFFECT GROUND OR SURFACE WATER, THE SAFE DRINKING WATER ACT (SDWA) AND CLEAN WATER ACT (CWA) PROVIDE POTENTIAL ARARS FOR ESTABLISHING REMEDIATION GOALS; I.E., MAXIMUM CONTAMINANT LEVELS (MCLS), MAXIMUM CONTAMINANT LEVEL GOALS (MCLGS), AND WATER QUALITY CRITERIA (WQC). IN ADDITION, THE PCB SPILL POLICY, WHICH IS NOT AN ARAR, ALTHOUGH IT IS PUBLISHED IN THE CODE OF FEDERAL REGULATIONS, HAS BEEN CONSIDERED IN DETERMINING CLEANUP LEVELS AT THE SITE. THE TSCA PCB REGULATIONS OF IMPORTANCE TO SUPERFUND ACTIONS ARE FOUND IN 40 CFR SECTION 761.60 - 761.79, SUBPART D: STORAGE AND DISPOSAL. THEY SPECIFY TREATMENT, STORAGE, AND DISPOSAL REQUIREMENTS FOR PCBS BASED ON THEIR FORM AND CONCENTRATION.

TSCA REQUIREMENTS DO NOT APPLY TO PCBS AT CONCENTRATIONS LESS THAN 50 PPM; HOWEVER, PCBS CANNOT BE DILUTED TO ESCAPE TSCA REQUIREMENTS. CONSEQUENTLY, UNDER TSCA, PCBS THAT HAVE BEEN DEPOSITED IN THE ENVIRONMENT AFTER THE EFFECTIVE DATE OF THE REGULATION, FEBRUARY 17, 1978, ARE TREATED, FOR THE PURPOSES OF DETERMINING DISPOSAL REQUIREMENTS, AS IF THEY WERE AT THE CONCENTRATION OF THE ORIGINAL MATERIAL. FOR EXAMPLE, IF PCB TRANSFORMERS LEAKED OIL CONTAINING PCBS AT GREATER THAN 500 PPM, THE SOIL CONTAMINATED BY THE OIL WOULD HAVE TO BE EXCAVATED AND DISPOSED OF AS IF ALL OF THE PCB-CONTAMINATED SOIL CONTAINED PCBS AT GREATER THAN 500 PPM. THIS REFLECTS AN INTERPRETATION OF THE ANTI-DILUTION PROVISIONS IN TSCA (40 CFR 761.1(B)). EPA HAS CLARIFIED THAT TSCA ANTI-DILUTION PROVISIONS ARE ONLY APPLICABLE TO CERCLA RESPONSE ACTIONS THAT OCCUR ONCE A REMEDIAL ACTION IS INITIATED.

THE DETERMINATION OF WHETHER CONTAMINATED MATERIAL SHOULD BE CONSIDERED A SOIL OR AN INDUSTRIAL SLUDGE WILL BE MADE SITE SPECIFICALLY DURING REMEDIAL DESIGN CONSISTENT WITH THE CURRENT PROCESS FOR CLASSIFYING MATERIAL SUBJECT TO THE LAND DISPOSAL RESTRICTIONS AS EITHER A PURE WASTE OR A SOIL AND DEBRIS CONTAMINATED WITH A WASTE.

THE REQUIREMENTS FOR STORAGE OF PCBS ARE DESCRIBED IN 40 CFR SECTION 761.65. THE REGULATIONS SPECIFY THAT PCBS AT CONCENTRATIONS OF 50 PPM OR GREATER MUST BE DISPOSED OF WITHIN ONE YEAR AFTER BEING PLACED IN STORAGE. THE REGULATIONS ALSO INCLUDE STRUCTURAL REQUIREMENTS FOR FACILITIES USED FOR THE STORAGE OF PCBS AND REQUIREMENTS FOR CONTAINERS USED TO STORE PCBS.

PCBS ARE SPECIFICALLY ADDRESSED UNDER RCRA IN 40 CFR 268 WHICH DESCRIBES THE PROHIBITIONS ON LAND DISPOSAL OF VARIOUS HAZARDOUS WASTES. NOTE THAT RCRA REGULATIONS ONLY APPLY TO WASTE THAT IS CONSIDERED HAZARDOUS UNDER RCRA; I.E., LISTED IN 40 CFR 261.3 OR CHARACTERISTIC AS DESCRIBED IN 40 CFR 261.2. PCBS ALONE ARE NOT A RCRA HAZARDOUS WASTE; HOWEVER, IF THE PCBS ARE MIXED WITH A RCRA HAZARDOUS WASTE, THEY MAY BE SUBJECT TO LAND DISPOSAL RESTRICTIONS.

PCBS ARE ONE OF THE CONSTITUENTS ADDRESSED BY THE LAND DISPOSAL RESTRICTIONS UNDER THE CALIFORNIA LIST WASTES. THIS SUBSECTION OF WASTES COVERS LIQUID HAZARDOUS WASTES CONTAINING PCBS AT CONCENTRATIONS GREATER THAN OR EQUAL TO 50 PPM AND NON-LIQUID HAZARDOUS WASTES CONTAINING TOTAL CONCENTRATIONS OF HALOGENATED ORGANIC COMPOUNDS (HOCS) AT CONCENTRATIONS GREATER THAN 1000 PPM. PCBS ARE INCLUDED IN THE LIST OF HOCS PROVIDED IN THE REGULATION (APPENDIX III PART 268).

AS DESCRIBED IN 40 CFR 268.42(A)(1), LIQUID HAZARDOUS (RCRA LISTED OR CHARACTERISTIC) WASTES CONTAINING PCBS AT CONCENTRATIONS GREATER THAN OR EQUAL TO 500 PPM MUST BE INCINERATED IN A FACILITY MEETING THE REQUIREMENTS OF 40 CFR 761.70. LIQUID HAZARDOUS WASTES CONTAINING PCBS AT CONCENTRATIONS GREATER THAN OR EQUAL TO 50 PPM, BUT LESS THAN 500 PPM MUST BE INCINERATED OR BURNED IN A HIGH EFFICIENCY BOILER MEETING THE REQUIREMENTS OF 40 CFR 761.60. A METHOD OF TREATMENT EQUIVALENT TO THE REQUIRED TREATMENT MAY ALSO BE USED UNDER A TREATABILITY VARIANCE PROCEDURE IF THE ALTERNATE TREATMENT CAN ACHIEVE A LEVEL OF PERFORMANCE EQUIVALENT TO THAT ACHIEVED BY THE SPECIFIED METHOD AS DESCRIBED IN 40 CFR 268.42(B).

LIQUID AND NON-LIQUID HAZARDOUS WASTES CONTAINING HOCS IN TOTAL CONCENTRATION GREATER THAN OR EQUAL TO 1000 PPM MUST BE INCINERATED IN ACCORDANCE WITH THE REQUIREMENT OF 40 CFR 264 SUBPART O. AGAIN, A METHOD OF TREATMENT EQUIVALENT TO THE REQUIRED TREATMENT, UNDER A TREATABILITY VARIANCE, MAY ALSO BE USED.

ALL EXTRACTED AND TREATED WATER WOULD HAVE TO MEET NPDES REQUIREMENTS PRIOR TO SURFACE WATER DISCHARGE. A DETERMINATION OF THE LOCATION OF THE DISCHARGES, WHICH IS EXPECTED TO BE MADE DURING DESIGN, IS NECESSARY BEFORE AN IDENTIFICATION OF WHETHER THE DISCHARGES ARE OFF-SITE VS ON-SITE AS DEFINED IN THE NCP (40 CFR PART 300.400(E)).

GROUNDWATER CLEAN-UP GOALS ARE ESTABLISHED AS MCLS, PROPOSED MCLS (PMCLS) AND CANCER POTENCY FACTORS (CPFS) AND ARE PRESENTED IN TABLE 6-6

FOR THE COMPOUNDS IDENTIFIED IN GROUNDWATER. AS DISCUSSED IN SECTION 9.1, A WAIVER MAY EVENTUALLY BE NECESSARY FOR THE GROUNDWATER AS IT IS UNLIKELY MCLS WILL BE MET. THIS IS DUE TO THE PRESENCE OF DENSE NON-AQUEOUS PHASE LIQUIDS IN THE FRACTURE SYSTEM PRESENT AT THE VARIOUS SITES. ALL SOURCE TREATMENT ALTERNATIVES ARE EXPECTED TO MEET ARARS.

WHERE EXCAVATION IS REQUIRED, THE REQUIREMENTS OF THE CLEAN AIR ACT UNDER 40 CFR PART 50 CONCERNING PARTICULATES AND VOLATILE ORGANIC EMISSIONS WILL BE REQUIRED TO BE MET.

LONG-TERM EFFECTIVENESS AND PERMANENCE

GROUND WATER TREATMENT AND DISCHARGE

EXTRACTION OF CONTAMINATED GROUNDWATER WILL BE EFFECTIVE IN CONTAINING

THE PLUME OVER THE LONG-TERM. IT IS UNLIKELY THAT THE SOURCE OF THE PLUME CAN BE REMOVED IN THIS MANNER. THEREFORE, THE EXTRACTION IS NOT A PERMANENT REMEDY, ALTHOUGH IT DOES ACCOMPLISH THE GOAL OF PREVENTING FURTHER CONTAMINATION OF THE AQUIFER.

SOURCE TREATMENT

THERMAL SEPARATION AND INCINERATION PROVIDE FOR REMOVAL AND DESTRUCTION OF THE CONTAMINANTS FROM THE WASTE AND SOIL. THESE ARE PERMANENT TREATMENT ALTERNATIVES. OFF-SITE DISPOSAL OF WASTES PROVIDES LONG-TERM EFFECTIVENESS IN ISOLATING WASTES, BUT CONTAINMENT STRUCTURES MAY BE SUBJECT TO FAILURE, SO THAT THIS ALTERNATIVE IS LESS PERMANENT THAN A THERMAL TREATMENT PROCESS. THE POSSIBLE FAILURE OF CONTAINMENT STRUCTURES IS APPLICABLE TO ON-SITE CONTAINMENT FACILITIES AS WELL. IT IS UNKNOWN AS TO THE LONG-TERM EFFECTIVENESS AND PERMANENCE OF BIOREMEDIATION. TO DATE, NO STUDIES ACHIEVING CLEAN-UP CRITERIA HAVE BEEN REPORTED.

REDUCTION OF MOBILITY, TOXICITY, OR VOLUME

GROUNDWATER TREATMENT

EXTRACTION OF CONTAMINATED GROUNDWATER WILL REDUCE THE VOLUME OF CONTAMINANTS IN THE AQUIFER AS WELL AS REDUCE THE MOBILITY OF THOSE CONTAMINANTS REMOVED THROUGH TREATMENT OF THE EXTRACTED WATER. THE NO ACTION ALTERNATIVE OR USE OF INSTITUTIONAL CONTROLS WILL HAVE NO IMPACT ON THE MOBILITY, TOXICITY, OR VOLUME OF CONTAMINATION PRESENT AT THE SITE.

SOURCE TREATMENT

THERMAL SEPARATION REMOVES THE CONTAMINANTS SO THEY CAN BE DESTROYED IN A MORE CONDENSED, MANAGEABLE STATE. THEREFORE, THERMAL SEPARATION REDUCES THE MOBILITY, TOXICITY AND VOLUME OF THE CONTAMINANTS PRESENT IN THE SOLIDS AT THE SITE. INCINERATION DESTROYS THE CONTAMINANTS, THEREBY

ELIMINATING TOXICITY AND MOBILITY, AND REDUCING VOLUME. CONTAINMENT OF WASTES REDUCES THE MOBILITY OF THE CONTAMINANTS, HOWEVER, CONTAINMENT STRUCTURES MAY BE SUBJECT TO FAILURE. GLYCOLATE DECHLORINATION WOULD REDUCE THE TOXICITY OF CONTAMINANTS. SOLIDIFICATION WOULD REDUCE THE MOBILITY OF THE CONTAMINANTS. BIOREMEDIATION MAY REDUCE THE TOXICITY OF CONTAMINANTS OVER THE LONG-TERM. OFF-SITE DISPOSAL OF WASTES DOES NOT AFFECT THE INHERENT TOXICITY, MOBILITY, OR VOLUME OF THE WASTE.

SHORT-TERM EFFECTIVENESS

GROUND WATER TREATMENT

AIR STRIPPING MAY HAVE THE FOLLOWING SHORT-TERM EFFECTS:

RISKS TO WORKERS FROM EXPOSURE TO DRILLING FLUIDS AND SOIL DURING THE

INSTALLATION OF THE GROUND WATER EXTRACTION WELLS.

RISKS TO WORKERS AND ENVIRONMENT FROM RELEASE OF CONTAMINATED WATER BECAUSE OF ACCIDENTAL SPILLAGE.

RISKS TO WORKERS, ENVIRONMENT AND NEARBY MEMBERS OF THE PUBLIC FROM UNCONTROLLED EMISSIONS.

THE REMEDIAL DESIGN WILL INCLUDE ALL NECESSARY MEASURES TO MINIMIZE POTENTIAL ADVERSE SHORT-TERM EFFECTS ON PUBLIC HEALTH OR THE ENVIRONMENT.

INSTITUTIONAL CONTROLS WOULD BE EFFECTIVE IN THE SHORT TERM. THEY WOULD PREVENT THE PUBLIC FROM COMING INTO CONTACT WITH CONTAMINATION OR CONTAMINATED MATERIAL IN THE SHORT TERM.

SOURCE TREATMENT

ALL ALTERNATIVES REQUIRING EXCAVATION OF CONTAMINATED MATERIALS HAVE SHORT-TERM IMPACTS ON THE ENVIRONMENT DUE TO THE RELEASE OF VOLATILE CONTAMINANTS INTO THE AIR.

OFF-SITE DISPOSAL OF CONTAMINATED SOILS OR OFF-SITE INCINERATION OF THESE WASTES INVOLVE TRANSPORTATION OF THE WASTE, INCREASING SHORT-TERM RISK TO POPULATIONS ALONG THE TRANSPORT ROUTE. CONSOLIDATION OF MATERIALS ON THE PLANT SITE ALSO INVOLVES A SHORT-TERM RISK TO POPULATIONS ALONG THE TRANSPORT ROUTE TO THE PLANT SITE. THESE RISKS CAN BE MINIMIZED BY UTILIZING AN EXPERIENCED CONTRACTOR FOR THESE TASKS.

IMPLEMENTABILITY

GROUND WATER TREATMENT

AIR STRIPPING AND CARBON ADSORPTION ARE BOTH PROVEN TECHNOLOGIES. TREATMENT SYSTEMS AND VENDORS ARE READILY AVAILABLE AND NO IMPEDIMENT TO

IMPLEMENTATION OF THE ALTERNATIVE IS FORESEEN.

SOURCE TREATMENT

THERMAL SEPARATION AND ON-SITE INCINERATION ARE FULLY IMPLEMENTABLE. OFF-SITE DISPOSAL OF THE CONTAMINATED SOIL IS IMPLEMENTABLE, AS IS SOLIDIFICATION. EXCAVATION AND OFF-SITE INCINERATION MAY BE DIFFICULT DUE TO AVAILABILITY OF INCINERATOR CAPACITY IN SOUTH CAROLINA. GLYCOLATE DECHLORINATION IS A RELATIVELY NEW TECHNOLOGY AND WOULD, THEREFORE, BE DIFFICULT TO IMPLEMENT AT THE SITE. CONSTRUCTION OF A TSCA LANDFILL WOULD NOT BE POSSIBLE DUE TO SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL RESTRICTIONS ON PERMITTING SUCH FACILITIES.

COST-EFFECTIVENESS

ESTIMATED COSTS FOR EACH ALTERNATIVE ARE AS FOLLOWS:

ALTERNATIVE	MILLIONS OF DOLLARS
NO ACTION	
ALTERNATIVE 1	$ 5.1
ALTERNATIVES INVOLVING LITTLE OR NO TREATMENT	
ALTERNATIVE 2	$ 5.3
ALTERNATIVE 3	$ 7.9 - 8.6
ALTERNATIVE 4	$10.3 - 11.0
ALTERNATIVE 5	$12.7
ALTERNATIVE 6	$57.0
ALTERNATIVES THAT MINIMIZE THE NEED FOR LONG-TERM MANAGEMENT	
ALTERNATIVE 8	$14.4 - 57
ALTERNATIVE 10	$27.1
ALTERNATIVE THAT INCLUDES TREATMENT AND REQUIRES LONG-TERM MANAGEMENT	
ALTERNATIVE 13	$11.2 - 15.1
ALTERNATIVES THAT MINIMIZE THE NEED FOR LONG-TERM TREATMENT	
ALTERNATIVE 7	$29.4
ALTERNATIVE 11	$34.5 - 78.4
ALTERNATIVE 12	$62.4 - 99.2
ALTERNATIVES THAT REQUIRES LONG-TERM MANAGEMENT	
ALTERNATIVE 9	$39.6 - 50.6

STATE ACCEPTANCE

THE STATE OF SOUTH CAROLINA HAS CONCURRED WITH THE SELECTED REMEDY.

COMMUNITY ACCEPTANCE

TWO PUBLIC MEETINGS WERE HELD DURING THE PUBLIC COMMENT PERIOD AT THE SITE. CITIZENS VOICED SOME CONCERNS OVER THE SELECTED REMEDY BUT APPEARED TO BE SATISFIED BY THE AGENCY'S RESPONSES. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD WERE IN THE FORM OF REQUESTS FOR MORE INFORMATION. ONE COMMENT RECOMMENDED EPA CONSTRUCT A TSCA LANDFILL AT A "SAFE" SITE IN THE COUNTY. THE COMMENTS WERE ADDRESSED IN THE RESPONSIVENESS SUMMARY.

#SR
9.0 THE SELECTED REMEDY

THE REMEDY SELECTED FOR OPERABLE UNIT ONE OF THE SANGAMO WESTON/TWELVE MILE CREEK/LAKE HARTWELL PCB CONTAMINATION SITE IS:

EXTRACTION AND TREATMENT BY AIR STRIPPING AND/OR CARBON ADSORPTION OF CONTAMINATED GROUNDWATER AT THE DODGENS, BREAZEALE, CROSS ROADS AND PLANT SITES;

DISCHARGE OF TREATED WATER TO THE NEAREST VIABLE SURFACE WATER BODY IN ACCORDANCE WITH APPLICABLE REGULATIONS;

EXCAVATION OF MATERIALS CONTAMINATED WITH GREATER THAN 1 PPM OF PCBS AT THE NIX AND WELBORN PROPERTIES AND TRANSPORT OF THE MATERIALS TO THE SANGAMO PLANT SITE FOR STAGING AND APPROPRIATE TREATMENT

EXCAVATION OF MATERIALS CONTAMINATED WITH GREATER THAN 10 PPM PCBS ON THE REMAINING FOUR PRIVATE PROPERTIES (TROTTER, DODGENS, BREAZEALE AND CROSS ROADS) AND TRANSPORT TO THE SANGAMO PLANT SITE FOR STAGING AND APPROPRIATE TREATMENT;

BACKFILL TWO FEET OF CLEAN FILL AT EACH OF THE PRIVATE PROPERTIES WHERE CONTAMINATED MATERIALS OF GREATER THAN 1 PPM REMAIN (TROTTER, DODGENS, BREAZEALE AND CROSS ROADS);

EXCAVATE MATERIAL CONTAINING GREATER THAN 25 PPM CONCENTRATION OF PCBS ON THE PLANT SITE;

TREAT ALL EXCAVATED MATERIALS TO 2 PPM PCBS USING THERMAL SEPARATION TECHNOLOGY ON THE PLANT SITE. DURING REMEDIAL DESIGN, A TREATABILITY STUDY WILL BE CONDUCTED TO DETERMINE IF ANY OF THE CONTAMINATED MATERIALS WILL REQUIRE ADDITIONAL TREATMENT BEYOND THERMAL SEPARATION IN ORDER TO MEET THE 2 PPM CRITERIA. IF NECESSARY, A ROD AMENDMENT WILL BE

COMPLETED TO ACCOUNT FOR THIS REQUIRED TREATMENT; AND

REPLACE REMEDIATED SOIL ON THE PLANT SITE

THIS REMEDY WILL ATTAIN A (10-6) CANCER RISK LEVEL AS IT REMOVES THE SOURCE OF THE DIRECT CONTACT THREAT AND CONTAINS THE CONTAMINATED GROUNDWATER TO PREVENT FUTURE CONTACT.

9.1 DESCRIPTION OF RECOMMENDED ALTERNATIVE GROUNDWATER TREATMENT

THE ULTIMATE GOAL OF THIS REMEDIAL ACTION IS TO RESTORE THE GROUNDWATER TO ITS BENEFICIAL USE, WHICH AT THIS SITE IS A DRINKING WATER AQUIFER (SEE TABLE 6.6 FOR GROUNDWATER CLEAN UP CRITERIA). BASED ON THE INFORMATION OBTAINED DURING THE REMEDIAL INVESTIGATION, AND THE ANALYSIS OF ALL REMEDIAL ALTERNATIVES, EPA BELIEVES THAT IT MAY BE POSSIBLE TO

ACHIEVE THIS GOAL FOR SELECT AREAS USING THE PLANNED REMEDIAL MEASURES.

THE ABILITY TO ACHIEVE CLEAN UP GOALS AT ALL POINTS THROUGHOUT THE AREA OF CONTAMINATION CANNOT BE DETERMINED UNTIL THE EXTRACTION SYSTEM HAS BEEN IMPLEMENTED, MODIFIED AS NECESSARY AND PLUME RESPONSE MONITORED OVER TIME. IF THE SELECTED GROUNDWATER PUMP AND TREAT REMEDY CANNOT MEET THESE HEALTH BASED RESTORATION GOALS, AT ANY OR ALL OF THE MONITORING POINTS DURING IMPLEMENTATION, THE CONTINGENCY MEASURES AND GOALS MAY REPLACE THE SELECTED MEASURES AND GOALS FOR THESE PORTIONS OF THE PLUME. SUCH CONTINGENCY MEASURES WILL, AT A MINIMUM, CONTAIN THE PLUME TO WITHIN THE ZONE CURRENTLY EXCEEDING HEALTH-BASED LEVELS. THESE CONTAINMENT MEASURES ARE STILL CONSIDERED TO BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, AND ARE TECHNICALLY PRACTICABLE UNDER THE CIRCUMSTANCES.

THE SELECTED REMEDY WILL INCLUDE GROUND WATER EXTRACTION FOR AN UNKNOWN PERIOD, DURING WHICH TIME THE SYSTEM'S PERFORMANCE WILL BE CAREFULLY MONITORED ON A REGULAR BASIS AND ADJUSTED AS WARRANTED BY THE PERFORMANCE DATA COLLECTED DURING OPERATION. MODIFICATIONS MAY INCLUDE ANY OR ALL OF THE FOLLOWING:

A) AT INDIVIDUAL WELLS WHERE CLEANUP GOALS HAVE BEEN ATTAINED, PUMPING MAY BE DISCONTINUED;

B) ALTERNATING PUMPING AT WELLS TO ELIMINATE STAGNATION POINTS;

C) PULSE PUMPING TO ALLOW AQUIFER EQUILIBRATION AND ENCOURAGE ADSORBED CONTAMINANTS TO PARTITION INTO GROUND WATER; AND

D) INSTALLATION OF ADDITIONAL EXTRACTION WELLS TO FACILITATE OR ACCELERATE CLEANUP OF THE CONTAMINANT PLUME.

TO ENSURE THAT CLEANUP GOALS CONTINUE TO BE MAINTAINED, THE AQUIFER WILL BE MONITORED AT THOSE WELLS WHERE PUMPING HAS CEASED ON AN OCCURRENCE OF

EVERY ONE YEAR FOR A PERIOD OF FIVE YEARS FOLLOWING DISCONTINUATION OF GROUND WATER EXTRACTION.

IF, IN EPA'S JUDGEMENT, IMPLEMENTATION OF THE SELECTED REMEDY CLEARLY DEMONSTRATES, IN CORROBORATION WITH STRONG HYDROGEOLOGICAL AND CHEMICAL EVIDENCE, THAT IT WILL BE TECHNICALLY IMPRACTICABLE TO ACHIEVE AND MAINTAIN REMEDIATION GOALS THROUGHOUT THE AREA OF ATTAINMENT, THE CONTINGENCY WILL BE IMPLEMENTED.

WHERE SUCH A CONTINGENCY SITUATION ARISES, GROUND WATER EXTRACTION AND TREATMENT WOULD TYPICALLY CONTINUE AS NECESSARY TO ACHIEVE MASS REDUCTION AND REMEDIATION GOALS THROUGHOUT THE REST OF THE AREA OF ATTAINMENT.

SANGAMO PLANT SITE

GROUNDWATER AT THE SANGAMO PLANT SITE OCCURS PRIMARILY WITHIN THE JOINT AND FRACTURE SYSTEM OF THE BEDROCK. GROUNDWATER DISCHARGE FROM WELLS SURROUNDING THE RIDGE WOULD CONTAIN PRIMARILY VOCS. THIS WATER WOULD BE TREATED BY AIR STRIPPING. GROUNDWATER DOWNGRADIENT OF AREAS A, B, E, AND THE WASTE WATER TREATMENT FACILITY WOULD BE TREATED BY CARBON ADSORPTION. IN THIS AREA, RI DATA SHOWED PCBS IN GROUNDWATER COLLECTED FROM 10 OF 17 WELLS. VOCS HAVE BEEN DETECTED IN A MAJORITY OF THESE WELLS. TREATED WATER WOULD BE DISCHARGED INTO TOWN CREEK.

BREAZEALE SITE

THE ASSUMED PUMPING SCHEME FOR THE BREAZEALE SITE CONSISTS OF GROUNDWATER EXTRACTION WELLS SCREENED IN THE SATURATED PORTIONS OF THE SAPROLITE AND FLOODPLAIN DEPOSITS.

EXTRACTED GROUNDWATER WOULD CONTAIN VOCS AND WOULD BE TREATED THROUGH AIR STRIPPING AND/OR CARBON ADSORPTION (IF NECESSARY). TREATED WATER WOULD BE DISCHARGED INTO WOLF CREEK.

DODGENS SITE

THE ASSUMED PUMPING SCHEME FOR THE DODGENS SITE CONSISTS OF GROUNDWATER EXTRACTION WELLS SCREENED IN THE SATURATED PORTIONS OF THE SAPROLITE.

EXTRACTED GROUNDWATER IS EXPECTED TO CONTAIN VOCS AND AT LEAST ONE SEMI-VOLATILE ORGANIC COMPOUND. COLLECTED GROUNDWATER WOULD BE TREATED THROUGH AIR STRIPPING AND/OR CARBON ADSORPTION (IF NECESSARY). TREATED WATER WOULD BE DISCHARGED TO MIDDLE FORK TWELVEMILE CREEK.

CROSS ROADS SITE

THE ASSUMED PUMPING SCHEME FOR THE CROSS ROADS SITE CONSISTS OF GROUNDWATER EXTRACTION WELLS SCREENED IN THE SATURATED PORTIONS OF THE SAPROLITE.

EXTRACTED GROUNDWATER IS EXPECTED TO CONTAIN VOCS AND POSSIBLY OTHER HAZARDOUS SUBSTANCE LIST COMPOUNDS. COLLECTED GROUNDWATER WOULD BE TREATED THROUGH AIR STRIPPING AND/OR CARBON ADSORPTION (IF NECESSARY). TREATED WATER WOULD BE DISCHARGED TO AN UNNAMED TRIBUTARY OF TWELVEMILE CREEK.

SOURCE EXCAVATION AND TRANSPORTATION

THE FIRST STEP IN THIS ALTERNATIVE WOULD INCLUDE EXCAVATION OF SOLID MATERIALS AFFECTED WITH GREATER THAN 1 PPM PCBS ON THE NIX AND WELBORN PRIVATE PROPERTIES, GREATER THAN 10 PPM PCBS ON THE TROTTER, DODGENS, BREAZEALE AND CROSS ROADS PROPERTIES AND 25 PPM PCBS AT THE PLANT SITE. FOLLOWING EXCAVATION, THE MATERIALS WOULD BE TEMPORARILY STOCKPILED ON THE PLANT SITE. THE MATERIAL TO BE REMEDIATED CONSISTS OF APPROXIMATELY

2,900 CUBIC YARDS OF SOLID WASTE AND APPROXIMATELY 48,200 CUBIC YARDS OF CONTAMINATED SOIL AND SEDIMENT. THE LAGOON SEDIMENTS WOULD BE DREDGED AND DEWATERED PRIOR TO TRANSPORT TO THE TREATMENT AREA. LIQUIDS PRODUCED DURING DEWATERING WOULD BE TEMPORARILY STORED IN TANKS AND THEN TRANSPORTED FOR TREATMENT IN THE LEACHATE TREATMENT UNIT AT THE ON-SITE TSCA LANDFILL. THE AVERAGE HAUL DISTANCE FROM ON-SITE.EXCAVATION AREAS WOULD BE LESS THAN APPROXIMATELY ONE-HALF MILE. THE AVERAGE HAUL DISTANCE FROM REMOTE SITE EXCAVATION AREAS WOULD BE APPROXIMATELY 2.5 MILES. SOLIDS TREATED TO TWO PPM OR LESS IN THE THERMAL DESORPTION UNIT WOULD BE DISPOSED OF ON-SITE. LIMITED FIELD TRIALS MAY BE REQUIRED TO CONFIRM TREATMENT EFFECTIVENESS AND TO CHARACTERIZE TREATMENT RESIDUALS.

EACH OF THE TREATMENT PROCESS OPTIONS WOULD REQUIRE PRE-PROCESSING OF THE SOLIDS TO REMOVE OVERSIZED ITEMS AND TO REDUCE THE PARTICLE SIZE. THE ASSUMPTION OF A ONE PERCENT REJECTION RATE IS USED BECAUSE MUCH OF THE AFFECTED AREAS ARE NOT COVERED WITH THICK STANDS OF TREES. THESE MATERIALS WOULD REQUIRE OFF-SITE DISPOSAL AS A TSCA REGULATED WASTE IN A PERMITTED LANDFILL.

EXCAVATED AREAS WILL BE BACKFILLED WITH NATIVE SOIL, GRADED, AND RESTORED TO SUPPORT VEGETATION.

ANY POTENTIAL LONG-TERM MIGRATION AT GROUND SURFACE BY THE LOW CONCENTRATIONS OF WASTE CONSTITUENTS THAT REMAIN IN PLACE WOULD BE LIMITED BY PLACEMENT OF CLEAN BACKFILL.

SOURCE TREATMENT

THERMAL DESORPTION (OR THERMAL SEPARATION) IS A PROCESS OPTION RETAINED FROM THE SCREENING OF THERMAL TREATMENT TECHNOLOGIES. A PROPRIETARY SYSTEM REPRESENTED THE TECHNOLOGY IN THE FEASIBILITY STUDY REPORT ANALYSIS. THIS RECORD OF DECISION IDENTIFIES THERMAL DESORPTION OR SEPARATION AS THE PREFERRED TREATMENT ALTERNATIVE. EXACT DETAILS OF THE PROCESS, INCLUDING TREATABILITY STUDIES WILL BE DEVELOPED AS PART OF THE REMEDIAL DESIGN.

THE PROCESS ENVISIONED IS A MOBILE PROCESS IN WHICH SOILS OR SLUDGES WITH ORGANIC COMPOUNDS ARE HEATED IN A ROTARY KILN. VOLATILIZED ORGANICS ARE TRANSFERRED, USING NITROGEN AS THE CARRIER GAS, AND COOLED TO CONDENSE ORGANIC COMPONENTS. THE CONDENSED COMPONENTS ARE THEN COLLECTED FOR FURTHER TREATMENT AT AN APPROPRIATE FACILITY.

THIS SYSTEM WOULD CONSIST OF THE FOLLOWING TYPICAL UNIT OPERATIONS:

* MATERIAL PREPROCESSING/SORTING

* ROTARY KILN THERMAL SEPARATION

* CARBON ADSORPTION UNIT (OR COMBUSTION AFTERBURNER)

* COOLING AND CONDENSATE TRAIN

* OFF-GAS HANDLING TRAILER

* RESIDUALS MANAGEMENT UNIT

ON THE BASIS OF PILOT STUDIES, A TREATMENT CAPACITY OF FIVE TONS PER HOUR CAN BE EXPECTED. ASSUMING A TYPICAL DENSITY OF APPROXIMATELY 1.3 TONS PER CUBIC YARD OF MATERIAL, THE ESTIMATED TIME EXPECTED TO COMPLETE TREATMENT WOULD BE IN EXCESS OF TWO YEARS. THIS ESTIMATE IS BASED ON THE USE OF ONE TREATMENT SYSTEM AND A MINIMUM OF 30 PERCENT DOWNTIME.

9.2 COST

THE COSTS FOR THIS ALTERNATIVE, ARE INCLUDED IN APPENDIX D OF THE FEASIBILITY STUDY REPORT. THE ESTIMATED PRESENT-WORTH COST IS GIVEN BELOW:

OPTION 11B: THERMAL SEPARATION - $47,900,000 - 63,300,000

THE COSTS IN THIS ALTERNATIVE HAVE A POTENTIAL TO VARY FROM THE ESTIMATED COSTS DUE TO SEVERAL FACTORS:

* UNKNOWN HYDRAULIC CHARACTERISTICS OF THE AQUIFER. IN-FIELD TESTS PRIOR TO AND DURING THE REMEDIAL DESIGN ARE REQUIRED TO FULLY CHARACTERIZE THE SITE HYDROLOGIC PROPERTIES.

* UNPREDICTABLE FLOW AND CONSTITUENT REMOVAL RATES.

* VOLUME OF EXCAVATED SOLIDS MAY EXCEED THE LANDFILL DESIGN VOLUME.

STATUTORY DETERMINATIONS

THE SELECTED REMEDY SATISFIES THE REQUIREMENTS OF SECTION 121 OF CERCLA.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT:

THE SELECTED REMEDY WILL PERMANENTLY TREAT THE GROUNDWATER AND SOIL AND REMOVES OR MINIMIZES THE POTENTIAL RISKS ASSOCIATED WITH THE WASTES. DERMAL, INGESTION, AND INHALATION CONTACT WITH SITE CONTAMINANTS WOULD BE ELIMINATED, AND RISKS POSED BY CONTINUED GROUNDWATER CONTAMINATION WOULD BE REDUCED.

ATTAINMENT OF ARARS:

THIS ALTERNATIVE WILL COMPLY WITH ARARS. A COMPLETE DISCUSSION OF THE ARARS WHICH ARE REQUIRED TO BE ATTAINED IS INCLUDED IN CHAPTER 8. CHAPTER 8 ALSO DESCRIBES THOSE REQUIREMENTS CONSIDERED AS TBCS (TO BE

CONSIDERED). GROUNDWATER CLEAN-UP CRITERIA ARE ADDRESSED IN CHAPTER 6 (TABLE 6.6).

COST-EFFECTIVENESS:

THE GROUNDWATER AND SOURCE REMEDIATION TECHNOLOGIES ARE MORE COST-EFFECTIVE THAN THE OTHER ALTERNATIVES CONSIDERED PRIMARILY BECAUSE THEY PROVIDE GREATER BENEFIT FOR THE COST.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

THE SELECTED REMEDY REPRESENTS THE MAXIMUM EXTENT TO WHICH PERMANENT SOLUTIONS AND TREATMENT CAN BE PRACTICABLY UTILIZED FOR THIS ACTION. OF THE ALTERNATIVES THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND COMPLY WITH ARARS, EPA AND THE STATE HAVE DETERMINED THAT THE SELECTED REMEDY PROVIDES THE BEST BALANCE OF TRADE-OFFS IN TERMS OF LONG-TERM EFFECTIVENESS AND PERMANENCE, REDUCTION IN TOXICITY, MOBILITY OR VOLUME ACHIEVED THROUGH TREATMENT, SHORT-TERM EFFECTIVENESS, IMPLEMENTABILITY, COST AND ALSO CONSIDERING THE STATUTORY PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT AND ALSO CONSIDERING STATE AND COMMUNITY ACCEPTANCE.

PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

THE PREFERENCE FOR TREATMENT IS SATISFIED BY THE USE OF THE LOW TEMPERATURE THERMAL TREATMENT SYSTEM TO REMOVE CONTAMINATION FROM SOIL, SEDIMENTS AND WASTE AT THE SITE AND THE USE OF AIR STRIPPING/CARBON ADSORPTION TO TREAT CONTAMINATED GROUND WATER AT THE SITE. THE PRINCIPAL THREATS AT THE SITE WILL BE MITIGATED BY USE OF THESE TREATMENT TECHNOLOGIES.

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TABLE 5-9
PCB(1) CONCENTRATIONS DETECTED IN SURFACE SOILS:
NIX SITE

SAMPLE NO.	PCB CONCENTRATION AROCLOR 1248	AROCLOR 1254	TOTAL
NXSS-1	0.32	0.36	0.68
NXSS-2	ND	0.13	0.13
NXSS-3	ND	ND	ND
NXSS-4	1.1	2.5	3.6
NXSS-5	ND	ND	ND
NXSS-6	0.75	0.41	1.16
NXSS-7	24.	16.	40.
NXSS-8	0.538	0.65	1.168

NXSS-9	4.1	5.5	9.6
NXSS-10	ND	ND	ND
NXSS-11	0.75	2.8	3.55
NXSS-12	ND	0.26	0.26
NXSS-13	19.	47.	66.
NXSS-14	13.	15.	28.
NXSS-15	ND	6.6	6.6
NXSS-16	7.8	15.	22.8
NXSS-16 DUPLICATE	8.1	15.	23.
NXSS-17	ND	0.51	0.51
NXSS-18	ND	ND	ND
NXSS-19	ND	ND	ND
NXSS-20	ND	ND	ND
NXSS-21	ND	0.24	0.24
NXSS-22	ND	13.	13.

ND NONE DETECTED.
(1) CONCENTRATIONS ARE IN PARTS PER MILLION (DRY WEIGHT). AROCLORS LISTED ARE THE ONLY AROCLORS DETECTED.

TABLE 5-10

PCB CONCENTRATIONS DETECTED IN SUBSURFACE SOILS:
NIX SITE

SAMPLE IDENTIFICATION (BORING NO. & SAMPLE INTERVAL)	PCB CONCENTRATION(1) AROCLOR 1248	AROCLOR 1254	TOTAL PCBS
NXSB-1 (3.5-5.0)	ND	ND	ND
NXSB-2 (3.5-5.0)	ND	ND	ND
NXSB-3 (4.0-6.0)	ND	0.06	0.06
NXSB-3A (4.0-6.0)	ND	ND	ND
NXSB-3B (2.5-4.0)	ND	ND	ND
NXSB-3B (5.0-6.5)	ND	ND	ND

NXSB-4 (2.0-4.0)	ND	0.4	0.4
NXSB-4 (4.0-4.8)	NA	NA	NA
NXSB-4, 4A, 4B	ND	ND	ND
NXSB-5 (3.5-5.0)	ND	ND	ND
NXSB-5 (3.5-5.0) DUPLICATE	ND	ND	ND

ND - NONE DETECTED
ND - NOT ANALYZED

(1) CONCENTRATIONS ARE IN PARTS PER MILLION (DRY WEIGHT). AROCLORS LISTED ARE THE ONLY AROCLORS DETECTED.